June 5, 1967

COMMENTED NOTES
MR. GORMAN'S COPY
6-5-67

No comment addressed to DEP-A

I-DIR

B 6/15

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n. 6/26

NOTES 6/5/67 MAUS

FUNDING OF MSFC LAUNCH SUPPORT AT KSC - We have received information to the effect that KSC has proposed a change in the MSFC procurement plans submitted to OMSF for approval. The request has been made to OMSF and provides for direct negotiation and direct funding of launch vehicle support activities between OMSF and KSC. This will require a change in our policy which has been to exercise funding control through sub-allotments from MSFC to KSC, based on KSC estimates. The IO point of view is to accept this KSC approach and change the procurement plans accordingly since, in their experience, the sub-allotment arrangement has not proven to be a successful management control. The MSF practice has been to specify the dollar funding to be set aside for KSC, which effectively negates any control by MSFC. *I.O. Do you recommend to endorse KSC's request, in case it comes up in Man. Exec. Meets.? B*

LAUNCH VEHICLE DEVELOPMENT - We have received word informally that there has been an approval within OSSA for a FY 69 new start to put Centaur on the Titan III-C. This program would involve $22M over a period of three years (FY 69, 70, 71). We understand that the decision was made during the week of May 29 that this would be a new start for Lewis. Your proposal that Saturn IB and Saturn V be produced at a 4x4 rate as a fulfillment of a national capability and allocated "free" by Mr. Webb to the program offices might be a deterrent to such new development efforts. *← Next letter to GEM is an attempt to keep SatIB/Centaur alive B*

I.O. agrees. The original idea of keeping a tighter control on the contractor to prevent overlapping or double charging never materialized. A reasonable overall coordination is done between the centers and we would do this also under separate funding.

Wts

Hans - It is not surprising that KSC would hold out the major KSC arrangement as the exemplary way of doing business, and then appeal the single thread of activity which has Pretend — it is so the way of those who want independence of any but X. B

6/15

NOTES 6/5/67 BALCH

S-IC-4 Stage - The engine-to-stage alignment check delayed removal of the stage from the test stand until today, 6/5/67. Most of the pressure calibration trouble which caused the discrepancies in pressure transducer data obtained during the S-IC-4 firing on 5/16/67 has now been traced to the calibration lab console, with only minor errors attributable to the field setup utilized by Boeing.

S-IC-5 Stage - Boeing plans have now been revised to provide for change-out of Engines 3 and 5 at Michoud instead of at MTF. Current schedule calls for shipment of stage to MTF about 6/17/67.

S-II-3 Stage - Information has been received from the S-II Stage Office that the S-II-3 stage is now expected to arrive at MTF about 7/29/67.

S-II A-1 Test Stand - Open items on facility are still being worked off by the Corps of Engineers, with final completion now expected about 6/30/67. Integrated test of stand and GSE with simulated stage is still planned for 6/14/67 through 6/16/67.

GE Support Contract - Negotiations with GE on Fiscal Year 1967 general support services are nearing completion. Award is expected to be ready to forward to MSFC for approval by 6/13/67.

TV Special on MTF - Representatives from WLBT-TV, Jackson, Mississippi, were on site during the past week to work on a thirty-minute TV special on MTF.

B 6/15

NOTES 6/5/67 BELEW

ADVANCED STUDIES AT LANGLEY RESEARCH CENTER (LRC) FOR ORBITAL SPACE STATIONS: This office was represented at a meeting with LRC on 6/1/67 to discuss the orbital space station work of MSFC and obtain a briefing on the related activities at LRC.

Generally, it was shown that an orbital experiment is desirable to obtain information on the physiological effects of long-term zero g conditions in comparison to intermitten conditioning by means of artifical gravity. The Langley Centrifuge studies (Convair, San Diego) will not simulate a flight system until early 1970 and are presently considering a ground-fitted workshop or LEM as the carrier. Mr. F. Williams, R-AS, pointed out that considerations should also be given to pre-installation into a spent stage workshop.

Several technical reports were obtained covering artifical g deployable structures, flexible window materials, etc. ✓

MULTIPLE DOCKING ADAPTER (MDA) CREW REQUIREMENTS: On June 1 and 2, MSFC had discussions with Mr. Robert Sharp (Crew Station Office of McDonnell) and Astronaut Alan Bean in regard to the internal configuration of the MDA and experiment stowage. Significant points of interest were: (a) A need to compartmentalize the MDA into three basic sections (probably "soft floors") -- control, free area, and experiment operation. (b) Adjust experiment locations to better suit operation of experiments. We are studying an approach anyway in connection with the contingency planning action from MSF. ✓

SOLAR ARRAY FEASIBILITY STUDY: McDonnell Douglas Corporation (MAC/DAC has been given direction and contractual coverage to study and propose a mounting arrangement and method of deploying solar arrays on the S-IVB stage for use during the AAP mission. This direction is to consider only the Lockheed solar array, and the mid-term results will be presented to MSFC 6/9/67. ✓

PDR ACTION STATUS: A Weekly Status Report on the 106 actions which resulted from the PDR is being maintained. A review of the MSC actions was conducted at MSC on June 1. MAC/DAC is supplying most of their efforts. ✓

PRINCIPAL INVESTIGATOR'S (P.I.'s) MEETING: A meeting with all P.I.'s was held in Washington on June 1 and 2. The first day was devoted to technical presentations by MSFC to provide to the P.I.'s the status in the areas of thermal control, film radiation, communication windows, close loop on-board TV, contamination, and pointing control. The second day was devoted to the discussion of experiment operating time requirements. ✓

H-ALPHA TELESCOPE PROCUREMENT: The Request for Proposal (RFP) for H-Alpha Telescopes was released in mid-May and response has been requested by 6/15/67. ✓

LOCAL SCIENTIFIC SURVEY MODULE (LSSM): A memo restating the current MSF position on LSSM (that one of the two contractors should be selected in accordance with our procurement plan) was signed on Wednesday by Dr. Mueller and is now in Mr. Finger's office. Dr. Seamans' signature on the Determine and Findings (D&F) will allow us to proceed with the procurement actions. MSC has recommended two individuals to the LSSM Source Evaluation Board. ✓

Due to a delay in the procurement plan approval and the identification of a three to six month integration activity prior to shipment to KSC, the final definition phase of LSSM will be shortened to about five months. This will allow initiation of LSSM development to support a 1971 launch. ✓

NOTES 6-5-67 BROWN

B 6/15

H-1 ENGINE Eleven engine tests were conducted in support of the injector stability sampling program in Engine H-156-1D. Instability was initiated by bombing in the last seven tests. The induced rough combustion damped normal in all but Tests No. 5 and No. 11, in which the test was terminated by rough combustion monitor. Further testing will be conducted to determine the reason for the failure of the engine to damp.

F-1 ENGINE Brown Notes of May 22, 1967, indicated that the engine installed on S-IC-4 showed a slight increase in thrust (approximately 15K) on all five engines during stage static firing and mentioned that facility transducer calibration was suspect. Subsequent investigation to date confirm an approximate 1% error in the instrumentation. Final evaluation of data will be completed in about two weeks.

Water was found in the LOX pump inlet flange bolt holes after removal of production spare engine F-6049 which was tested at MSFC to determine performance following truck shipment from Canoga Park, California. Investigations revealed that water apparently collected from frost which had melted on the LOX duct. Rocketdyne indicated that this was a common problem, and their operating procedures at Edwards Field Lab required removal of water prior to engine removal from the test stand. This procedure is not contained in the manuals for firing at field sites and action has been taken to correct this omission. Engine F-6049 will be inspected to determine if water has entered the engine system.

The primary LOX seals reported in the Brown Notes of May 15, 1967 which are suspected of overheating because of an abnormal carbon lot are in the process of being replaced at MAF.

J-2 ENGINE The ECA's have been removed from both stages of 501 and returned to Rocketdyne for disassembly and inspection for contamination. (Details of the rationale for the original position taken on the ECA removal were included in my 5/23/67 memorandum to you. The decision to de-stack AS-501 minimized one of the main objections to removal and consequently the ECA's were removed to give maximum assurance of an uncontaminated system.)

A meeting with Rocketdyne and MSFC personnel on the helium regulator was held with Dr. Rees on June 1 to review the status of the parallel investigations being conducted by R&DO and Rocketdyne. No significant findings were reported relative to diaphragm failure, other than that it occurs after excessive cycling of the diaphragm. It was decided to replace the diaphragms in all regulators on 501 to assure maximum life. Decisions on all other engines will be held in abeyance pending results of further investigations. The rework of the ECA and helium regulator should be completed in time to support the current 501 re-stack date.

NOTES 6/5/67 CONSTAN

B 6/15

CCSD S-IB Stages

We have received authority to solicit proposal for Stages 13 through 28; however, we do not have authority to negotiate and finalize an agreement. In the interim, we have solicited a proposal for a 90-day extension of the current effort long-lead-time hardware for Stages 13 through 16, and it is planned that we will establish a pre-negotiation position on June 9. We will commence negotiations during the week beginning June 12, and complete them approximately June 20. It is planned that the supplemental agreement will be submitted to MSFC and Headquarters for review and approval with finalization of the supplemental on June 30, 1967. The Contractor's proposal for a 90-day extension is $6.8 Million. ✓

Quality S-IC

A joint survey (Boeing - NASA) of the Boeing Material Review Board progress. The survey will include as a minimum the review of past MRB decisions for adequacy, the MRB system, qualification of personnel, failure analysis and corrective action, and data reporting. ✓

Astronaut Visit

We received work that Astronaut McDivitt and 7 or 8 other astronauts will visit Michoud Assembly Facility on July 7, 1967. Details are being arranged through I. O. (Mr. Howard Lloyd). ✓

Voyager Assignment

Mr. Harry Fowler, Chief, Quality Engineering Office at MAF has accepted a temporary assignment (4 to 6 months) with the Voyager Program Office. He will assist in the establishment of the Quality and Reliability effort. ✓

NOTES 6/5/67 FELLOWS B 6/15

Primary Damper System for ML-1: The primary damper system for Mobile Launcher 1 has successfully completed retesting at KSC following refurbishment to remove hydraulic fluid contamination from gas lines. The damper system was cycled 10 times, then attached to the Launch Escape System 4 times satisfactorily. Both KSC and R-P&VE consider the system ready for use with AS-501. ✓

NOTES 6/5/67 GEISSLER

B 6/15

1. Mission Planning Task Force:

At the MPTF meeting, June 1 and 2, main emphasis was on the definition of a baseline for the "second" cluster, however, the strong interfaces with the "first" cluster and an "advanced" mission module entered the discussion almost continously. The present thinking can be summarized as follows:

The first cluster consists of one pair of flights (2nd and 3rd AAP) to establish the workshop, one revisit by a refurnished command module, one pair to carry up the LM/ATM with crew, and an open-ended number of revisits.

The second cluster officially still is a back-up for continued revisits of the first one. However, for planning purposes it is assumed that a new, second cluster will be established after the 6th AAP flight, (first revisits of the ATM), approximately early CY 1967. It will be very similar to the first cluster, except small state-of-the-art improvements to increase lifetime.

The mission will be continued orbital operation as long as possible, i.e.., one-half to one year. Orbit will be 50° inclination, the only major experiment/payloads the workshop and the App-A and possibly App-B package, no ATM. Primary payload improvements considered are jettioning of the nose cone and SLA panels and strap-on minutemen.

Ch. Mathews has expressed a stong preference of the strap-on's over apogee-kick very understandable, because it gives him a 8000 lbs payload increase on every flight, while the apogee kick will give him about the same (using solids, less if we use reignition of the IV-B) on unmanned flights only.

E.V. From an MSFC point of view, the preferred way would be to do both, getting about 8000 lbs for manned, about 15 k for unmanned flights.

Let's wait until we know our financial situation in FY '68 B

As Mathews is presently happy with 8000 lbs, it would be up to MSFC to push the apogee-kick. It should be a much less expensive 7 to 8 k lbs, than the minutemen, would give us the chance to deliver our payload, where needed, i.e., in 250 - 300 n.m. orbit, rather than in very low parking orbit, and have the customer pick it up there, via CSM-tug boat; and would make the Saturn I (uprated) a much better balanced (cost-effective) vehicle.

The advanced "mission module" (Houston' nonmenclature) or "ground-equipped workshop" (our) entered the discussion frequently. It appears, that the Houston people are working very hard, even if quietly, toward one system consisting of a "logistical" CSM and the "mission module". As the CSM is of course Houston's responsibility we are under a handicap to come up with a useful contribution in providing a "workshop" which will make an equally good or even better system. These questions will hit the MPTF rather soon. F. Williams was therefore contacted with the intend to establish an efficient information line and to pool forces to come up with the best possible ideas and proposals.

Frank Williams ↑

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NOTES 6-5-67 GRAU

B 6/15

1. S-II-1 STATUS: Lox tank dye penetrant inspection was completed May 28, 1967. Indications of five cracks were noted in the forward meridian weld and a gouge was found near "D" weld #2. These were reworked and acceptable. Lox tank X-ray inspection was completed May 30, 1967. Indication of a crack was found in the aft dollar weld between segment E and F. This has not yet been dispositioned. Removal of LH_2 tank forward insulation was in progress prior to de-stacking and tank entry. LH_2 tank entry was tentatively scheduled for yesterday, June 4, 1967, with completion of tank inspection scheduled for June 9, 1967.

2. S-IVB PROGRAM: The S-IVB-209 LH_2 probe of the PU system was inspected and replaced because of a faulty "Pin and Teflon Cap" installation similar to the condition which caused a one week delay for the S-IVB-503N static firing. In the future, all LH_2 PU probes will be X-ray inspected with the new Norelco X-ray equipment which is able to take sharp pictures of the probe joint from outside, across the S-IVB tank. This eliminates the need for entering the tank and disassembling the probe. The Norelco equipment has been procured based on recommendations of this Laboratory in order to improve the DAC X-ray welding inspection.

3. INSPECTION CRITERIA AND STANDARDS HANDBOOK: The "Apollo Electrical Inspection Criteria and Standards" document which has been compiled by Colonel Russell's committee is undergoing a final review this week in Daytona by all committee members and selected experts. Since I do not expect that different philosophies and different standards applied by various NASA centers and their contractors can be reconciled there, I have asked the MSFC representatives not to commit MSFC in questionable areas. When MSFC officially receives the document for approval and/or comment, it might become necessary to take exception to chapters where we consider criteria and standards to be too low. In previous sessions of the committee, considerable differences in design approaches became apparent which impact upon manufacturing, assembly, and quality control. It still does not seem to be common knowledge that an inspector cannot undo the sins of the designer.

NOTES 6/5/67 Haeussermann

1. Voyager Assignments. I have charged Mr. Otto A. Hoberg with the responsibility for the lead in activities for Astrionics Laboratory on the Voyager project. In addition, one Laboratory staff member, Mr. F. Brandner, is scheduled to leave this week for a temporary assignment to the Voyager Interim Program Office. Mr. Brandner will discuss his activity at the Pasadena office with Mr. Robillard on June 8, 1967.

2. ATM Principal Investigators' Meeting. The two most significant factors which MSFC presented to the PI's were: (a) The large amount of distortion of the optical axis for two experiments (NRL and Harvard College) due to thermal gradients. (b) The fogging effects of radiation on the film at the 250 n.mi. orbit. The ATM spar and the pointing control system provide adequate stability for the experiments but due to the amount of heat generated within an experiment and the poor "view" factor for thermal radiation, the optical axis is distorting due to the changes in their thermal gradients. All efforts are being exerted to reduce the amount of power within the experiment, improve the "view" factor along with other fixes in an attempt to avoid the need for an active thermal control system or other more sophisticated approaches, e.g., heat pipes. With respect to the film fogging, the simplest solution is to orbit at a lower altitude (160 n.mi.). However, the predicted orbital life is not sufficient at this altitude for the workshop and cluster missions. The PI's will work this problem from their end to see if a less sensitive film to radiation can be used.

3. ATM Digital Computer. An hour's discussion was held with Chuck Mathews on Friday concerning the ATM digital computer. He stated he would give us a decision by today.

4. ATM Test and Checkout Equipment at KSC. The MSFC approach for this equipment has been to utilize special purpose equipment and not involve any automated equipment (RCA 110 or ACE). KSC has indicated a preference for use of ACE and this is being investigated here at MSFC insofar as impacts to the ATM systems design. In about a week, GE will also provide an impact statement, including costs, for the utilization of ACE for ATM.

NOTES 6/5/67 HEIMBURG B 6/15

F-1

Work continued on the GOX pressurization system and the special instrumentation to be utilized for the lox depletion tests. This series of tests are scheduled to begin in approximately one week.

MODERATE DEPTH LUNAR DRILL PROJECT

Negotiations with Joy Manufacturing Company have been scheduled for Tuesday, June 6, 1967.

S-IVB (SACTO)

Pre-static checkout continues satisfactorily on S-IVB-209. The acceptance firing of S-IVB-209 remains scheduled for June 14, 1967, with no major problems foreseen.

S-IC (MTF)

The S-IC-4 stage removal from the test stand was postponed from June 1, 1967, to June 5, 1967, due to additional time required for engine/stage alignment checks. The S-IC-5 stage will be installed in the test stand in two to three weeks.

S-IC STAGE (MSFC)

The S-IC short lox tank was removed from the test stand on May 31, 1967. The S-IC-T stage was installed in the test stand on June 1, 1967.

SATURN V HOLDDOWN ARMS

Mr. Buchanan reported that KSC has inspected the holddown arms on LUT #1 and no cracks were found. Inspection has not been completed on the other sets at KSC.

ME Lab is still working to repair the cracks on the spare set. After repair, these will be re-tested.

SATURN V SWING ARMS (Reference Notes 5/22/67 Heimburg)

We have completed the cold shock, pressure test and water flow tests on the Arms 1, 4, and 6 lox lines. Only one problem was encountered: A flex metal bellows developed a leak after eight hours water flow; replaced hardware and completed test. Leak appears to have been caused by hinge pin rubbing on bellows, seems to be basic design problem. KSC was informed, but we do not know what action will be taken.

The Arms will be returned to "Arm Farm" for continued work on Lanyard Mods.

J-2X PROGRAM

A successful 15-second, 300 p.s.i. chamber pressure test was made on June 1, 1967. The next test scheduled for June 6, 1967, will be a 5-second test at 650 p.s.i. chamber pressure.

NOTES 6-5-67 HOELZER

B 6/15

NEGATIVE REPORT.

NOTES 6/5/67 JOHNSON

B 6/15

Additional FY-67 MSF Program Authority: Mr. Peil of MSF's Advanced Manned Missions Office advised that $225 K was available for Marshall to use on the Fuel Cell Reliability Program (905-34-05-01). Astrionics Laboratory felt that these funds could be obligated prior to June 30, 1967, by modifying the Allis Chalmers Contract NAS 8-2696. Mr. Peil was notified that the procurement request is being prepared and will be available for processing by June 5, 1967. He will, therefore, expedite the fund transfer to Marshall. The reliability program consists primarily of an in-house testing program. This type of work has been in progress in Astrionics Laboratory for about a year already. Funds will be utilized to secure additional test units for continuation of the testing program.

FY 68 908 Program: A discussion in Headquarters with Mr. Peil this past week indicated that our 908 program submission was being returned for additional work. The problem centers in relating the individual tasks to specific supporting development requirements for future AAP missions. We have not yet received sufficient indications as to the deficiencies, however, the general instructions received will probably necessitate a rewrite and resubmission of the material. This will curtail present efforts to initiate early procurement in this program. We will keep you informed of the outcome of the effort.

NOTES 6-5-67 KUERS

B 6/15

No significant items to report.

NOTES 6-5-67 LUCAS

B 6/15

1. S-II CRACK ASSESSMENT TEAM: The team chartered to investigate the cause of the weld cracking phenomenon experienced on the S-II stage structure has completed a preliminary assessment. At this time, the cause of cracking cannot be attributed completely to the stage pneumostat. Although considerable effort remains before the assessment can be finalized, it is the committee position that the problem can be defined sufficiently in the next two weeks to outline measures required for solution. It does not appear that any modifications will be required in stage design. ✓

2. REMOVAL AND INSPECTION OF ALL MAIN OXIDIZER VALVES: An Engineering Field Inspection Request is being issued by Rocketdyne to require removal, inspection and cleaning of all main oxidizer valves from engines in the field. This action was prompted by the recent discovery of a second instance of a contaminated main valve needle bearing. A previous occurrence of main oxidizer valve needle bearing contamination resulted in burning in the area of the bearing and failure of the valve. The 501 engines will be inspected after the demating. ✓

3. S-II SPRAY FOAM INSULATION: NAA/SD has a well-defined development plan for spray foam which was generated in conjunction with the MSFC task team. ✓ Material specifications have been developed and are updated as new information becomes available. Two material candidates are being considered. Furthermore, manufacturing process specifications and quality control specifications are available. Plans include a 100 percent ultrasonic inspection of the insulated hardware in addition to selected local destructive testing. NAA/SD will be prepared to present the insulation development program with recommendations for flight application to MSFC on June 14, 1967. ✓

4. TITANIUM PRESSURE VESSEL MEETING AT MSC: Gene Cataldo (Materials Division) attended an MSC briefing to KSC on the CSM titanium pressure vessel safety factors. The meeting, held at MSC, was attended by Dr. Debus and Dr. Gilruth. Although no clear assurance that the problem was in hand was expressed by either Center director, it was concluded that all that can be done has been done, short of delaying the program long enough to fabricate new CSM titanium pressure vessels. Apparently, little confidence was expressed in the situation because of the long time at pressure experienced by these vessels while the spacecraft is on the launch pad. No plans for additional work were presented by MSC.

B.L.

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How critical is that, in your view?

5. ACOUSTIC TEST FACILITY: Our new Acoustic Facility was utilized for the first time on May 26, 1967. ✓ Two tests were run on a large 9 foot by 11 foot honeycomb panel in the chamber to gather data which will indicate the type and magnitude of vibrational response of heavy payload-type structures when the exciting source is predominantly acoustic. The maximum overall sound pressure level attained was 138 dB. ✓

NOTES 6/5/67 MAUS

B 6/15

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B 6/15

NOTES 6/5/67 RICHARD

Sequencing the J-2 engine from the stage rather than the engine electronic control assembly: During the past several months there have been quite a few deficiencies found in the J-2 engine ECA package. These have ranged from cracked solder joints contamination to failures of timers. This office became concerned about this problem, particularly the timer failure, and investigated the possibility of sequencing the engine using the stage switch selector rather than the engine ECA package. The results proved very favorable. This has been discussed with the managers of the Saturn IB, Saturn V, and Engine Project Offices, and effort is being undertaken, in conjunction with these Offices and P&VE and Astrionics, to prepare the necessary ECR's and plans so that a complete study can be made, first on the elimination of the ECA for the J-2 engine and second on an interim solution of sequencing the engine from stage logic using ECA component testing circuitry presently available. The results of this study will be used by IO and R&DO to determine what plan of action should be taken to increase the reliability of the J-2 engine. ✓

NOTES 6/5/67 RUDOLPH

B 6/15

1. AS-501 Launch Vehicle at KSC:

   o S-II Stage LOX tank inspection was completed on Thursday, 1 June 67. Five (5) minor surface flaws were found in the girth weld - these have already been grooved out.

   o S-II Stage was de-erected on Saturday, 3 June 67, and LH_2 tank inspection began on Sunday, 4 June 67.

   o The tentative vehicle processing schedule is as follows:

   - re-erection: S-II Stage - Sunday, 18 June 67
     S-IVB Stage - Monday, 19 June 67
     IU Stage - Tuesday, 20 June 67

   - erect spacecraft - Tuesday, 20 June 67
   - roll-out - Monday, 7 August 67
   - CDDT - Monday, 28 August 67
   - RP-1 Loading - Sunday, 17 September 67

2. S-II-7 Stage at Seal Beach:

   o In our Notes 5/22/67 Rudolph, (copy attached), it was indicated that the shipment of the S-II-7 Stage to MTF would be delayed an estimated 7 weeks as it was necessary to replace 2 quarter panels on LH_2 cyl 3/cyl 4 assembly. The panels are now being replaced and S&ID has revised their assembly, checkout and test plans for this stage. It is presently estimated that the stage will only be one week late in meeting the KSC on-dock date of 21 May 68.

1 Attachment: Notes 5/22/67 Rudolph - (DIR, I-DIR & R-DIR's copy only)

NOTES 6/5/67 SPEER

B 6/15

1. AAP FLIGHT OPERATIONS: Chuck Mathews requested in a recent letter a briefing on the use of HOSC for AAP. He also requested that such potential use should be coordinated with MSC, obviously unaware of my ongoing meetings with Kraft. In addition, he stated that use of the HOSC would be in conflict with the Lake Logan Agreement. I feel we have to take exception to this: MSC's lead role is not sole ownership of flight operations; Apollo developed facilities and available manpower are to be used in AAP to the maximum extent. I talked to Mathews together with Belew on 6/2 and gave him a 30 min tour of the HOSC. We have removed several misconceptions on his part, and I am preparing the requested briefing.

2. AS-501 ABORT CAPABILITY FROM LCC: Gen. Phillips has given approval for flying 501 without abort capability from the Launch Control Center (LCC). MSC has been requested to make a recommendation on the feasibility of initiating an abort from MCC-H between ignition and tower clearance. This recommendation will include appropriate procedures and mission rules for subject abort case. We have participated in discussions between Gen. Bolender, MSC and KSC on this subject. MSC is somewhat reluntant to agree to initiate the abort from MCC-H. However, they are very interested in a safe recovery of the spacecraft if catastrophic conditions are encountered. We will continue to track this item closely to assure that MSC's recommendation is compatible with MSFC's interests.

3. ODOP TRACKING SYSTEM: TRW, KSC and the Eastern Test Range gave presentations to Gen. Stevenson on the use of ODOP for near-pad impact prediction. KSC's earlier conclusion was confirmed that ODOP is the best available system. I expect that MSFC will be directed shortly to initiate procurement for ODOP transponders for follow-on IB and V vehicles. Another evaluation will be required after the next three flights.

4. PROPOSED APOLLO LAUNCH DATA SYSTEMS (ALDS) SYSTEM CHANGES: In answer to Kraft's proposal to change the ALDS, Gen. Stevenson requested that the ALDS Communications Working Group (chaired by Mr. Quinn, MSC) be employed for the technical coordination of any proposed change. Discussions with Mr. Quinn have lead us to believe that MSC as a Center in not together on this issue. Quinn expects to call a special meeting of the group if and when a uniform MSC position is established.

NOTES 6/5/67 TEIR B 6/15

SATURN IB MINUTEMAN STRAP-ONS: During the last week, we have initiated actions leading toward a detailed design analysis both by CCSD and in-house for incorporation of four Minuteman strap-ons on the Saturn IB. On June 1st CCSD reviewed with us (I.O., R&DO, and KSC) the results of their studies conducted over the last two years and presented a first draft of a design study work statement. We expect to issue a change order to the Saturn IB Systems Engineering Contract this week for an accelerated two month detailed design study. Ludie Richard's office and the R&DO laboratories are assisting in finalization of the work statement, will initiate in-house studies in certain areas, will provide technical guidance to CCSD during their study, and assist in the evaluation required prior to making an implementation decision. Mr. Mathews, by teletype dated June 1, 1967, has requested an in-depth presentation for Headquarters, in about thirty days, of this configuration covering both the definition work already accomplished as well as further definition that can be completed in the next thirty days. The Saturn IB Program office and the AAP Program office will work closely with R-TO for the R&DO technical support required for this presentation. A Center level dry run will be scheduled prior to the Headquarter's presentation.

Because of the importance of this activity to the Saturn IB and AAP Programs, I feel that it is essential that this study be handled as a high Center priority action so that we arrive at the correct implementation decision at the earliest date possible.

CRITICAL SUPPLIER WORKSHOPS: As a result of the supplier workshops, CCSD's procurement requirements are being revised to provide suppliers with the critical failure mode of their parts. They are also making installation photographs which will be furnished to the critical suppliers. These are the first of several actions planned by CCSD to improve communications with their critical suppliers.

FOLLOW-ON PROPOSAL EVALUATION: CCSD's proposal for extending the present CPFF contract for long leadtime materials for periods of 30, 60 and 90 days, was received June 1st. My position is to consider only the 90 day extension, since the primary purpose was to buy time for an orderly negotiation of the 16-stage proposal. We are to meet with Michoud personnel on June 8 and 9 for a first review of the proposal. Due to the cost, Headquarters' approval will be required. It is hoped that a quick approval may be obtained.

B 6/15

NOTES 6-5-67 STUHLINGER

1. ATM: During a PI Meeting in Washington on June 1, particular attention was paid to the problems of thermal design, and radiation damage to photographic emulsions. Several possibilities to improve the thermal situation were recognized, but it is not at all certain whether they will fully solve the problem. In order to provide the high optical-mechanical accuracy of the telescopes of Harvard College Observatory and NRL, temperature gradients across the instruments as well as across their mounting bases, and also the absolute temperatures within the instruments, must be kept within extremely close tolerances. It appears that the astronauts may be required to closely monitor the supersensitive experiments during exposures.

From the film irradiation data we received last week, it must be concluded that the film fogging problem on ATM is serious. We expect to have a detailed appraisal of the situation, and suggestions for remedial actions, within a few weeks.

2. ATM CONTAMINATION EXPERIMENTS: Contract negotiations were held on June 1 with Martin-Denver for a five-month effort to provide detailed design and prototype hardware for the two ATM contamination experiments (photometric and optical surface array). Experiments Office indicates that there may now be some possibility of flying on an earlier Apollo flight than the planned AAP #1 - AAP #2.

NOTES 6/5/67 WILLIAMS

B 6/15

1. Negative Report.

June 12, 1967

B 6/12

NOTES 6/12/67 BALCH

S-IC-4 Stage - Malfunction of the main derrick on the S-IC test stand on 6/5/67 delayed removal of the S-IC-4 stage from the stand from 6/5/67 to 6/6/67. The stage was shipped to Michoud on 6/7/67.

S-IC-5 Stage - Stage is now expected to arrive at MTF on 6/19/67 and to be installed in the test stand the following day.

S-II-3 Stage - Stage is still expected to arrive at MTF about 7/29/67.

S-II A-1 Test Stand - Integrated test of stand and GSE with simulated stage is still planned for 6/14/67 through 6/16/67.

Corrective Action on Derricks - As a result of the malfunction of the main derrick on the S-IC test stand, action has been initiated to accomplish the following with respect to the derricks on all test stands and also those on the S-II Vertical Checkout Building:

a. Complete checkout of all electrical control circuitry.
b. Modification to provide completely fail-safe system.
c. Thorough definition of maintenance program, to include user, corrective, and preventive maintenance.
d. Identification of spares provisioning requirements.

Power Outage - At approximately 12:36 p.m. on 6/10/67, there was a power interruption in the S-II Test Control Center and A-1 test stand. Circuit breakers were reset manually, and power was completely restored by 1:00 p.m. Power interruption was apparently caused by a lightning stroke. Further investigation is being conducted. No tests were under way in either test complex.

NOTES 6/12/67 BELEW

B 6/12

MISSION PLANNING TASK FORCE: New planning guidelines for the 1970 mission includes at least one revisit to the old cluster, using a refurbished CM to extend solar astronomy, and then establish a new cluster at 50° inclination, 260 NM altitude. The new cluster will be oriented around the combined APPS A and APPS B experiment.

LOCAL SCIENTIFIC SURVEY MODULE (LSSM): Dr. Seamans has not given formal approval of the LSSM but indications are that he will direct the LSSM procurement be opened for competition and that the RFP and material for briefing of potential contractors be prepared on this basis.

L.B. Beyond the 2? B

ATM MSC/GAEC MANAGEMENT MEETING: We attended the first ATM MSC/GAEC monthly management meeting at GAEC on June 7 to participate in the discussion of LM modifications for ATM. The more pertinent points resulting from the meeting were: (1) MSC changed the LM/ATM free flight from the 4th day to the 28th day, (2) GAEC will initiate LM/ATM docking simulations with the cluster on June 12 with their Full Mission Engineering Simulator at Bethpage, N. Y., and (3) MSC indicated that the ATM controls and display panel interface with the LM spacecraft is more extensive and complicated than they had anticipated. Concerning item 1 above, the implications are that the probability of obtaining more solar data is improved in that if problems are encountered during the free flight mode, it would be after significant solar data had been obtained. On the contrary, the LM support equipment to conduct free flight will have to be maintained in a capable status for 28 days which could require more power, reduce reliability of the subsystems, etc. We plan to discuss item 3 in more detail with MSC.

ATM DIGITAL COMPUTER: We met with Mr. Mathews at this Center on June 2 for another discussion of the need and selection of a digital computer for the ATM. As in our April 27 meeting with Mr. Mathews, we stated our preference for the IBM 4 Pi computer in lieu of sharing the LM primary computer and gave him more detailed justification for our recommendation. Mr. Mathews promised his decision; on June 7 we reached agreement to implement the 4 Pi computer into the ATM design.

ADDITION OF IU STRUCTURE TO ATM VEHICLE: Mr. Fred Roberts of NASA Headquarters has informed us that the proposed addition of a 3-foot IU structure to the ATM launch vehicle will be handled by the Level 1 Apollo Applications Configuration Control Board on June 19.

GENERAL: Mr. Chuck Mathews indicated Dr. Mueller has recently asked for a rundown on the Orbital Workshop two floor concept. Looks like we will be required to review this in the near future. Mr. Mathews asked for reviews of the thermal status relative to Orbital Workshop, ATM and Airlock as early as Tuesday "Management Council Special Session." This request originated from a Dr. Mueller note to Mr. Mathews.

B 6/18

NOTES 6-12-67 BROWN

F-1 ENGINE There have been random occurrences of inner radial baffle bulging on the F-1 engine injector as a result of heat and internal pressures. (Copper has a plastic characteristic at 1200 degrees F.) Two injectors are in testing with a baffle with an improved cooling capability. The design improves the internal coolant flow characteristics and decreases the temperature from 1200 degrees to 800 degrees without adversely affecting the performance. ✓

H-1 ENGINE Since the previous reporting period, two additional tests have been conducted in support of the injector stability sampling program in Engine H-156-1 D. Instability was initiated by bombing in these tests. The first test damped normally and the second test was terminated by rough combustion monitor. This brought the total to three tests out of 13 which was terminated by RCC. The engine will be disassembled and inspected for discrepancies that could cause the engine to fail to damp. ✓

J-2 ENGINE The schedules for cleaning the main LOX valves and ECAs support the AS-501 re-stack schedule; however, the helium regulator re-work schedules do not. The last regulator will be delivered to KSC on June 20 and re-stack of the vehicle is scheduled for June 18. The stage offices are currently reconsidering their overall schedules to determine if a delay is acceptable or if the regulator should be installed after the vehicle is re-stacked. ✓

NOTES 6/12/67 CONSTAN

B 6/12

Engines

Engine No. H-7079 for S-IB-11 displayed noise in the turbine assembly when rotating. The turbine later "froze up" and would not rotate when 250 in. lbs. of torque was applied. Rocketdyne is investigating. Disposition is dependent upon the results of this investigation.

Post Storage Modification Operations

Concurrence has been given to a request by CCSD to establish a Post Storage Modification Operations, during which time engineering changes will be incorporated and other preshipment operations, which were deferred in order to prepare the stage for storage, may be performed. This will result in less traffic on the stage and produce a better stage than that of having continual work accomplished during the time the stage has been committed to long or short term storage at MAF.

F-1 Program

Due to problems with road clearances, all future F-1 engines will be received at the Gulfport, Mississippi Airport instead of Alvin Callender Field.

B 6/18

NOTES 6/12/67 FELLOWS

1. R&D Operations Cost Reductions: R&D Operations has again exceeded its fiscal year cost reduction goal which for this FY is $9 M. To date, $10.8 M has been submitted for inclusion in the MSFC Cost Reduction Program. Also, special emphasis is being placed on cost reduction awareness throughout R&D Operations in preparation for a visit by a special NASA team, planning to visit MSFC next month to review this program at the laboratory and office level (as opposed to last year's review at the R&DO level). ✓

2. KSC Support for Special R&DO Tasks: As reported in my 5/22/67 NOTES*, a basic understanding was reached with KSC for placing requirements on KSC and obtaining their responses in support of the special tasks. Further internal MSFC discussions have resulted in a fine cooperative arrangement with Dr. Speer's Mission Operations Office for the processing of special KSC support requirements. Dr. Speer has agreed to act as the R&DO agent in reviewing those requests to be sure they do not duplicate Saturn/Apollo documented requirements and that they are complete and meet administrative standards acceptable to KSC. Although the special support requirements will be formally approved by R&DO, Dr. Speer will remain the single MSFC point of commitment for these types of support requirements (Apollo and special) to KSC. ✓

*Copy attached.

NOTES 6/12/67 GEISSLER

B 6/18

1. AS-205 Mission Planning: The Flight Mechanics Panel is initiating work on the AS-205 (SA-205/CSM-101) mission which incorporates the MSC proposed "rendezvous exercise." This exercise will be accomplished after the first day and essentially consists of the astronauts approaching the S-IVB/IU/SLA to within a safe distance and station keeping for a while. The exercise will not include use of the "ejectable pod" (mentioned in item 1, Notes 5/22/67 Geissler), extra-vehicular activity (EVA), hatch openings, or docking subsystem. The FMP is proceeding to define the orbital characteristics, performance capabilities and associated mission data. The initial trajectories will be generated on a 120 X 150 n. mi. elliptical orbit (nominal S-IVB/IU orbital lifetime of $\approx$ 5.0 days) with a S/C weight of 36,300 lbs. The tradeoffs in orbital altitude, performance, etc., that are required to make the mission will be based on this data. We will continue to keep you informed of any further developments in this activity.

2. "Environment Induced Orbital Dynamics" Seminar: June 6 and 7 we conducted the subject meeting, which consisted of 4 sessions: (1) Mechanics of Orbital Decay: Session Chairman, Dr. J. V. Breakwell, Stanford University; Coordinator, R. Hill, R-AERO-F; (2) Aerodynamics Coefficient Prediction Methods: Session Chairman, Prof. G. N. Patterson, University of Toronto; Coordinator, H. Shirley, LMSC; (3) Atmospheric Models: Chairman, Maurice Dubin, OSSA; Coordinator, R. Smith, R-AERO-Y; (4) Experimental Engineering Program: Chairman, Dr. W. Johnson, R&DO, Coordinator, J. Ballance, R-AERO-A. The meeting was introduced by myself and R. Lavender with an exposition of the requirements posed by projects like OWS and ATM and concluded with a summary by Dr. R. Smelt, Chairman of the NASA Research Advisory Committee for Spacecraft Aerodynamics, who endorsed the need for more rigorous activities on low density aerodynamics, high altitude atmospheric research and solar activity investigations. Dr. Smelt stressed the need for more flight experiments for those problems which were exemplified by our proposed package "ODYSSEY" (Notes 3/6/67 Geissler). The meeting was restricted to invited speakers and attendees (6 speakers from Aero. Lab); we had a good response and generally a very high level of presentations and discussions. About 90 people from outside attended, including visitors from as far as Canada and Bonn University. Mr. H. Weidner gave a dinner talk to the guests, which was well received. The meeting was, according to many comments, highly successful. Especially the subject of solar flare prediction (Notes 5/15/67 Geissler) aroused a great deal of attention. In spite of this favorable outcome, I still anticipate quite some difficulties in selling the Odyssey experiment at OSSA, according to private discussions with Mr. Dubin, who advised me to try to sell the package as a general piggyback experiment carrier for ours as well as other experiments.

NOTES 6-12-67 GRAU

B 6/18

1. PRINCE/APIC: Mr. Paul Finestein, Chief, Technology Utilization Office, NASA, Washington, D.C., visited PRINCE/APIC last week and received the presentation and tour extremely well. He told us that the President has appointed a panel to study the Government's data bank. DOD's data banks have already been reviewed and the panel made uncomplimentary remarks about DOD's system. NASA is expecting an investigation from the panel next. We used the opportunity to give Mr. Finestein a presentation on the "Uniform Data Bank Approach" which was prepared by Brown Engineering based on a discussion we had with Mr. Cohen, Director, Reliability and Quality Assurance, AAP Office, Washington, late last year. The "Uniform Data Bank Approach" is a comparatively inexpensive enlargement of PRINCE/APIC to satisfy additional requirements as they are envisioned by Mr. Cohen for storing and retrieval of information in support of high reliability long life parts and materials for deep space flight.

Dr. Dorman who will visit MSFC ~~some day this week~~ in the near future has specifically asked to be made acquainted with PRINCE/APIC. It was agreed with Mr. Gorman and Mr. J. Foster to put the presentation "Uniform Data Bank Approach" on his agenda also. We tried to bring the NASA data bank problem into focus already last year when Dr. Seamans appointed a committee to appraise him of problem areas in NASA; Col. Murphy of Dr. Rudolph's office was the MSFC representative. Since this problem seems to get attention now, I would very much recommend that we give you the presentation "Uniform Data Bank Approach" at your earliest convenience. If NASA gives attention to the data bank problem, I am positive you will be asked about your opinion.

noted rsb 6/9

O.K. B

2. S-IC PROGRAM: Dye penetrant inspection of the welds on the upper and lower bulkheads of the fuel tank built for S-IC-8 revealed eight cracks, one of which was 0.180 inches deep by 0.400 inches long. The Boeing Company has stated that these cracks are not detrimental to tank integrity since the tank has passed hydrostatic test. This series of defects on S-IC-8 raises the question of how many of the S-IC-3 through S-IC-7 tanks have cracks since this was the first dye penetrant inspection performed by Boeing. The Boeing position regarding acceptability of cracks "since tanks have completed hydrostatic testing" is unacceptable. Further investigation is being made to determine the exact existing conditions.

NOTES 6/12/67 HAEUSSERMANN

B 6/18

1. ATM Experiments. The first ATM experiment interface requirement document (EIRD) review will be held at AS&E this week. Reviews for the other experiments will be held later this month. The document will establish the formal interface between the ATM and the experiment and serve as a contractual baseline. The thermal interface for the NRL and Harvard College Observatory experiments present the most formidable problem at this time. ✓

NOTES 6/12/67 HEIMBURG

B 6/18

noted Bly 6/19

F-1 ENGINE

Test FW-064 was conducted on the West Area F-1 Test Stand with F-1 Engine S/N F-5038-1. Primary purpose of this test was to evaluate the thrust vector control system with the new servo-actuator filter assembly.

MODERATE DEPTH LUNAR DRILL PROJECT

Drilling on Site No. 6A in the Howell, Tennessee structure was completed this week and drilling initiated at Site No. 6B. Negotiations of the Joy Manufacturing Company contract were held on Tuesday, June 6, 1967. Finalization of the contract will be handled by R-TEST-R and PR-PM. NASA Headquarters was informed of the status of the three proposed contracts. The Negotiations Determinations and Findings document of the Westinghouse contract has been revised and forwarded to Headquarters through Mr. Davis' office (AST-P). The Northrop Space Laboratories Contract has been sent to them for signature.

S-IB-10 (MSFC)

Stage S-IB-10 was removed from the Static Test Tower East on June 7, 1967. The stage was loaded aboard the barge and departed Huntsville for Michoud on June 8, 1967. Stage S-IB-11 is tentatively scheduled to arrive Huntsville in August 1967.

S-IC (MTF)

The S-IC-4 removal from the test stand began on June 5, 1967, and was completed at approximately 2 a.m. on June 6, 1967. Operational problems were encountered with the 200-ton derrick. The S-IC-5 stage is expected to be installed in the test stand on June 20, 1967.

ANSWER TO DR. VON BRAUN'S COMMENT (NOTES 5/29/67)

Presently the plan to fire the S-IC-T for approximately 40 seconds sometime during the latter part of July 1967. The prime objective is to verify that crew, stage, GSE and facility are in working order. We also intend on this firing to verify the design integrity of the Saturn V lift-off switch which is of greatly different design than the Saturn IB. Efforts are also being made to bring additional people from the Launch Site, Boeing and Rocketdyne, for on-the-job training with our people. The S-IC-T will then be kept in a state of readiness to be able to respond to any problems that might develop during the preparation and launch of Saturn V's.

CTL ACCIDENT

At approximately 11:05 a.m., Thursday, June 8, a test tank ruptured at CTL killing one technician and seriously injuring another. Both men were employees of Brown Engineering Company, sub-contractor for our mission support contractor, Vitro. Test tank was fabricated from two dished heads with the upper dome simulating the S-IVB stage upper bulkhead and quick-release manhole cover of the S-IVB Workshop. No tests were scheduled at the time. Exact details of conditions preceding the accident are still under investigation. You will be informed of latest findings independently of the Notes.

K.H. Request a 30-min briefing on the Lunar Drill Project. Please lay on jointly w/Stuhlinger. I'd like to know – who does what for whom on what schedule and against what overall flight objective? – how this is coordinated with I-AAP Matthews and MSC. B

NOTES 6-12-67 HOELZER

B 6/18

NEGATIVE REPORT.

B 6/18

NOTES 6-12-67 JOHNSON

S-027 Galactic X-Ray Mapping Experiment - Mr. Mathews, AAP Office, Hqrs. recently decided to assign this experiment to AS-206. As a result of this decision AS-211 I. U. will not be modified during manufacture at IBM to incorporate a "standard interface" for accepting flight experiments, e. g. a second flight of SO-27, Hydrostatic Gas Bearing (MSFC # 11) or Strap Down Platform (MSFC # 22). As a consequence, if experiment assignments to AS-211 are made, extensive modifications and accompanying retesting of AS-211 I. U. will be required.

OBLIGATION STATUS - SRT and Flight Experiments - Approximately 60% of the total authorized ART/SRT and Supporting Development program has been placed on contract. The obligation rate has accelerated rapidly during the last three weeks, and it is now anticipated that between 90 and 95 % of the FY-67 program authority will be reflected as obligated in the final status report for 6/30/67. It is expected that the unobligated carry-over will be finalized by mid-July.

Approximately 70% of the authorized Flight Experiments program has been obligated with total obligation expected by 6/30.

NOTES 6-12-67 KUERS

B 6/18

1. Weld Defects on S-II Structures: Analysis of the defects, encountered in S-II Structural welds, by our welding engineers resulted in revealing the following pertinent facts:

Contaminants on aluminum alloy surfaces are a major source of weld defects, such as porosity and inclusions. MSFC experience and studies funded by MSFC at technical institutes clearly indicate the metal removal (machining or scraping of surfaces) is the optimum surface preparation method. All other treatments, such as chemical cleaning, freon, alcohol, wire brushing, electro-cleaning increase the defect potential. Such conclusions are substantiated by data generated from our technology development contract with the Illinois Institute of Technology Research Institute (IITRI) on "Preparation and Instrumentation for Welding S-IC Components". We arranged for Mr. Saperstein, the principal engineer from IITRI on this work, to make a presentation last Thursday to NAA personnel at Seal Beach on the subject of his investigation and findings. ✓

2. Engineering Analysis of S-II Weld Procedure: The major sources of the defects, i.e. pores, chain porosity and crack like lines are reasoned to be as follows:

a. Irridite residue (from conversion coating of skins) because of insufficient depth of metal removal by inefficient scraping.

b. Interaction of aluminum and freon or alcohol causing oxide formation. Wire spacers, files, and wire brushes are cleaned by soaking or dipping in freon. In addition, the weld joint surfaces are swabbed at Seal Beach with freon just before welding.

c. Induced oxides. The combination of the open joint, created by wire spacers, and the heat of intermittent and continuous tack welds may cause excess oxide formation between the butting surfaces.

d. Recontamination of surfaces during jigging and preparation for welding.

The most common defects are oxide inclusions which become nucleation sites for gas pores and should be carefully differentiated from cracks. Our proposed "opposed nugget pulsed arc" welding technique avoids many of the contamination sources; also it is much less sensitive in creation of defects caused by surface contamination. ✓

B 6/18

NOTES 6-12-67 LUCAS

1. APOLLO TELESCOPE MOUNT (ATM) THERMAL CONTROL: The experiment principal investigators were briefed at NASA Headquarters 6-1-67 on the status of ATM experiment canister thermal control. The mounting spar has adequate thermal stability and all experiments can be controlled within their specified operating range of 70 ± 5°F. The High Altitude Observatory, Goddard Space Flight Center and American Science and Engineering Company experiments have adequate thermal stability (± 2 1/2 arc seconds) but the Harvard College Observatory (HCO) and Naval Research Laboratories (NRL) experiments do not. The main reason for the present discrepancy is a large increase in experiment size and internal power dissipation. Both HCO and NRL have increased electrical power requirements by an order of magnitude, and the size of all experiments has increased considerably. The principal investigators have been asked to determine the possibility of a significant reduction in power and/or relocation of power sources outside the experiments. Results will be reviewed in about a week.

2. J-2 ENGINE RESTART: (Reference Richard Notes 5-29-67) Modifications probably required to achieve a 15 minute restart capability include (a) retiming the engine lox turbine bypass valve, (b) reorificing the engine start tank refill lines, (c) supplying a heater blanket and power to the gas generator lox bootstrap line, and (d) a stage-supplied cryogenic purge to the engine turbine exhaust system. Engine reliability would be reduced due to the complexity of these changes and the limited number of tests that could be run at AEDC. The test effort required to verify the above changes at AEDC has been established and is oriented toward a completion of mid-1968. The program will necessarily impact the opportunity for early testing of the J-2S at altitude conditions.

3. SA-204/501 CORROSION INSPECTION RESULTS: Inspection of all stages in SA-204/501 launch vehicles has been completed at KSC by the stage contractors. The inspection, made in accordance with our guidelines, revealed evidence of corrosion but before serious consequences.

4. DAMPER: The ML-1 Redundant Hoist and the ML-2 Primary Damper were shipped to KSC on 6-10-67. The hardware was inspected and accepted by R-QUAL. The MSFC commitment was delivery on dock at KSC on 6-15-67. No open work remains for KSC. To accomplish the task on time required two shifts and Sunday work, mainly by R-ME and R-QUAL.

5. HIGH PRESSURE LOX TURBOPUMP: The 350K lox turbopump being developed for MSFC by Pratt and Whitney (early ACRE Program) was run with lox for the first time on 6-5-67. The pump reached a discharge pressure of 5705 psia and a flowrate of 4000 gpm. No anomalies were noted in the test.

6. ORBITAL WORKSHOP FLAMMABILITY TESTS: We have completed the second phase of our program to assess flammability of the Orbital Workshop (OWS) insulation with a damaged flame retardant liner. A flow of oxygen simulating the velocity anticipated in the OWS was directed across the damaged insulation. The aluminum liner thickness used was 0.002 inch thick. All test samples were ignited by a hot wire and all were self-extinguishing after burning an area of approximately 70 square inches. Testing of a 0.005 inch liner in a similar environment will be completed in the next two weeks.

7. S-II-4 LIGHTWEIGHT DESIGN STRUCTURAL TEST PROGRAM: The thrust structure/aft skirt assembly arrived at Bldg. 4619 at 4:10 p.m., Friday, 6-10-67. This is the first of the test specimens to be delivered by NAA/SD and is scheduled for test completion in December 1967. Since delivery of this assembly was not scheduled until 6-12-67, we are presently two days ahead of schedule.

NOTES 6/12/67 MAUS

B 6/12

Nothing of importance

B 6/12

NOTES 6/12/67 RICHARD

Overall Testing at KSC: A difference between the LVO (Dr. Gruene) technical approach to overall testing and that of their spacecraft counterparts has become apparent and is reflecting itself in our support to the testing operations. Basically, Dr. Gruene's people run some portion of each overall test off-nominal so as to have checked every portion of the system by launch time. This causes each event in plus time to vary in time from test to test.? The spacecraft people have their testing based on nominal runs only, and as a result a hardware-software incompatibility appears to exist between the launch vehicle and the spacecraft.? There is no flight problem.

L.R. I'm not sure I understand what you mean B

We have solutions to these problems, and we are meeting with KSC and MSC to solve these incompatibilities. This is basically a KSC technical problem, but it keeps reflecting into our design. We think this can be solved without it becoming an interface issue.

NOTES 6/12/67 RUDOLPH

1. S-II-1 Stage in Low Bay at KSC: LH_2 tank inspection is scheduled to be complete on Wednesday, 14 June 67 with re-erection scheduled for Sunday, 18 June 67. X-ray and dye penetrant discrepancies located in LH_2 tank welds are being investigated by P&VE and a decision as to acceptability or rework required is expected by Tuesday, 13 June 67.

Three of the five vacuum jacketed LH_2 feedlines have lost vacuum. Action is being taken to remove the lines for investigation. If spare lines can be cleared prior to restacking, no schedule impact will occur.

2. S-II-6 Stage at Seal Beach: The re-work of the welding flaws has been completed and the re-pneumostat testing was successfully completed on Friday, 2 June 67. The dye-penetrant inspection indicates flaws did not propagate during the re-pneumostat testing.

The S-II Stage welding flaw investigations have tentatively identified two problem sources of the cracks as follows:

The freon, used to clean the weld joints, leaves deposits which cause weld impurities.

The alodine coating, used to prevent oxidizing of the metal, is applied to the weld edge by S&ID. The mechanical method used for removing this material only removes to a depth of .001, whereas the alodine material can penetrate to .005. This residual material can cause weld flaws.

Weld samples are now being made which do not have alodine material near edge; and which use acetone for cleaning in lieu of freon. Tentative results indicate considerable improvement.

3. BP-30 Spacecraft at MSFC: All work necessary to modify the boilerplate spacecraft as a contingency payload for AS-501 will be completed on-schedule on Wednesday, 14 June 67. General Phillips has been notified that the spacecraft is available for shipment, if and when required.

4. Boeing Apollo Integration Effort: General Phillips has asked for the loan of Jim Murphy, my Deputy Manager, Management, for two weeks beginning Tuesday, 13 June 67. General Phillips needs help in getting the new Boeing Technical Integration effort organized and working. If you desire, we will give you a short briefing on the outcome of this effort right after his return.

Yes, please do B

5. J-2 Engine Minimum Restart Time: Reference your comments on Notes 5/29/67 Rudolph (copy attached). We understand that Dr. Lucas (P&VE) has prepared a presentation on this subject which will be shown to you as soon as practicable. In addition, the Saturn V Program Office in conjunction with the Engine Office will generate a plan for accomplishing first orbit restart.

Had it B

1 attachment: Notes 5/29/67 Rudolph - (DIR, I-DIR & R-DIR's copy only)

NOTES 6/12/67 SPEER

B 6/12

1. VOYAGER MISSION OPERATIONS: I attended the 2nd Voyager Mission Operations Working Group Meeting (chaired by Sam Rich) on 6/6 and the first meeting of the Mission Operations System Design Team (chaired by John Gates) on 6/7. F. Kurtz of my office is MSFC representative in both groups. Gates agreed with our request for MSFC participation in the Flight Path Analysis Control Team which was initially a JPL exclusive. He also agreed to MSFC's responsibility for all mission dependent hard and software. ✓ We reached full agreement on the potential use of the HOSC which would remain a MSFC responsibility to support MSFC flight controllers at Pasadena. ✓ Walt Eichwald was named as Flight Director and head of the design team. A more detailed report on the meeting was given to Dave Newby. ✓

2. AAP FLIGHT OPERATIONS INTERFACE: Representatives of I-MO and I-S/AA met with personnel from MSC on June 5 to discuss the MSC/MSFC AAP flight operations interface. In spite of Kraft's somewhat relaxed attitude there are still a number of major incompatibilities in two areas: (1) The conditions under which additional MSFC personnel (if any) are to be permanently assigned to MSC; (2) the total operations interface in view of MSC's plan to create inhouse operations working groups with little or no functional interface with the panel structure. I feel that a letter from you to Dr. Gilruth is required at this time and would like to brief you on this subject as soon as practical. Please do B

Noted. BB 6/19

3. NON-APOLLO REQUIREMENTS: I-MO and R-OM have agreed upon a procedure by which the submission of non-Apollo ground support requirements to KSC will be handled. This procedure avoids any unnecessary duplication of effort and any possible interference with Apollo or other program ground support requirements. A KSC-MSFC agreement is being drafted to recognize this agreement, and I-MO is writing a Special Project Requirements Document which will be used as the tool for official submission. ✓

4. AFETR BRIEFING ON RANGE ORBITAL TRACKING: The Eastern Test Range (ETR) presented a briefing to NASA range users on 6/7, on their support to high priority domestic and foreign space programs. This support may conflict with support of NASA programs. Although in the past ETR primarily supported the powered flight phase, they now allocate 75% of their time to orbital support. 22

Please cover this, too.

NOTES 6/12/67 STUHLINGER

B 6/18

No submission this week.

B 6/18

NOTES 6/12/67 TEIR

SATURN IB MINUTEMAN STRAP-ONS: The work statement for the CCSD Strap-on Study was agreed to with R&DO on 6/8/67 and a change order was issued to CCSD on 6/9/67. This phase will be concluded in about 3 months and will provide the design requirements and the launch vehicle configuration for the mission spectrum furnished in our groundrules. ✓

AAP LAUNCH RECYCLE CAPABILITY: Mr. C. Mathews, through the Mission Planning Task Force, has requested that MSFC and KSC analyze the feasibility of reducing the turn-around time between launches to 30 days. A set of ground-rules and guidelines was developed last week and will be provided to CCSD under the Saturn IB Systems Engineering Contract for their analysis of Mr. Mathews' request. It is planned that we will work closely with KSC to facilitate the integration of the final results of the CCSD analysis. ✓

AS-205 RENDEZVOUS MISSION: Gen. Phillips has approved the incorporation of a rendezvous by the spacecraft with the launch vehicle on AS-205. He has stated that this is not a primary objective and is to be considered secondary. The mission is not to be unduly complicated by incorporation of the rendezvous. We have agreed to inserting the spacecraft into a 120 X 150 NM elliptical orbit with a payload interface weight of 36, 300 lbs. This will be incorporated in the Flight Mission Assignments Document. MSC has dropped the requirement for a rendezvous pod. The spacecraft will separate from the launch vehicle approximately 3 hours after orbital insertion and will rendezvous within "station-keeping" distance of the launch vehicle after either the 16th or 32nd revolution (the exact distance has not been defined -- MSFC is to recommend to MSC through the Flight Mechanics Panel the safe distance after analyzing the S-IVB venting requirements and any safety hazards associated with the residual S-IVB propellants). ✓

Additionally, MSC has recently asked us to investigate the impact of maintaining an active C-Band Beacon during the rendezvous period. R-ASTR has been asked to evaluate impact to the launch vehicle of providing this capability. It is planned to answer the MSC request within the next 2 weeks. ✓

AS-204 PULL TEST: Although MSFC had, through the Mechanical Panel, obtained MSC approval on the static load portion of the SA-204/LM-1 Pull Test, NAA and Grumman contractors at KSC questioned the design configuration and Col. Petrone suspended this test when the MSC actionee was not available to verify that prime contractors agreed with the design. We have reconfirmed approval of the configuration and have so notified KSC. MSC has also agreed to notify KSC of their approval for the static load portion of the test. KSC is currently rescheduling the test. ✓

NOTES 6/12/67 WILLIAMS B 6/18

1. Visit to Langley:

Several weeks ago, I requested through Charlie Donlan that we tie closer together the Space Station work of the two Centers and that a group of MSFC personnel visit Langley and exchange briefings on our respective activities. Charlie and the LRC people were very receptive, and on June 1, twelve of us (IO and R&DO) visited LRC for an excellent first exchange on a broad scale. They rolled out the red carpet and exhibited their activities as well as a genuine interest to work very closely with us on all aspects of mutual interest. Several study efforts were pinpointed and action has been taken to have representatives of the other Center participate in an active way. (Prior to the visit, we had some gross representation; however, now I feel that it will be more complete and profitable for both.) In addition to the CMG (which ASTR in conjunction with the ATM is already working with them), several study/technology areas appear worthy of much more detailed working relationships - such as, Power Supply Systems, Life Support/Environmental Control Systems, Communication and Data Handling, Structural Design/Materials. We (via Mr. Dannenberg) plan to follow-up on these areas and tie them into our Space Station and Space Station experiment work as much as possible. ✓

2. Meeting with Vince Johnson:

For several weeks, we have attempted to follow-up your offer at the OSSA Senior Council meeting to work with Vince Johnson on the OSSA Vehicle activities. Finally, we had a meeting scheduled on June 5 with him. Also attending were Bill Teir, Bill Huber (who was ASO's prime interface with Vince on our support) and Dan Schyner from Trimble's shop.

It was pretty clear that Vince isn't too interested in a close working relationship with us since he has his own support contractor (Battelle) and is pretty much in bed with the Lewis Center. I feel we can provide him some support and we will attempt to do so. One specific item of interest - OSSA has in "its" '69 budget, money for the Titan III and Centaur with the plans that Lewis be the responsible center for the development/operational phase. The reason for not using IB Centaur - Vince said, "It's too expensive." Bill Teir will furnish OSSA (through channels) the new cost breakdown for the IB.

F.W. Was discussed with FEM on 6-17, Please get detail dope on action taken from Maus B

3. Long Range Plan:

As of the last few days, there is an item on the Management Council Executive Session to discuss the "Long Range Plan." We are working up some backup material for you and plan to review it with you on Monday, June 19. ✓ As I understand the planning via Trimble, it will just be a "discussion" type session with no formal presentations. I talked to Bill Stoney, and he said that Dr. Gilruth plans to give only some gross philosophical remarks (if anything) and doesn't want to get involved in a debate about where we go from here. 22 B Reason? B

4. Voyager - Phase B, Task D Contracts: Negotiations are proceeding, with target date of June 15 for contract initiations. Kick-off meetings are scheduled for June 20-21-22. ✓

June 19, 1967

NOTES
MR. GORMAN'S COPY
JUN 19 1967

With comments

Hoelzer note to U. Boyd
so Mr Gorman can
see comment directed
to Mr Rees on
3rd Generation
Computers.

R&D OPERATIONS

2135

CODE	NAME	INIT.	ACTION	INFORMATION
DIR	Dr. von Braun			

REMARKS

File 6/19 NOTES
Listed 7/13 9 PD
7-20

Subject: Col. Teir's June 19 NOTES:
SA-205 Attitude Control
Switchover Capability

I am attaching Fred Vreuls' reply to your question on the subject NOTES. Col. Teir's item does not refer to a guidance problem and will not lead us to a position of "...no IU guidance during the Saturn V lunar injection burn".

Enc:
a/s

B 7/14

RECEIVED
JUL 12 1967
DIR

CODE	NAME	DATE
R-DIR	H. Weidner	7-11-67

MSFC - Form 495-1 (October 1963)

Routing & Distribution to: Weaver

Info Copies to: Weidner, Maier, Cook

Date

mo. 7/18

INFORMAL NOTE

TO: Mr. Weidner, R-DIR June 30, 1967

Proposed spacecraft attitude control of launch vehicle -- AS-205 Mission

This interface will be implemented as follows:

a. The astronaut can "flip a switch" to obtain attitude control of the launch vehicle from the spacecraft.

b. The launch vehicle/spacecraft is maneuvered via the astronaut to the desired attitude.

c. The launch vehicle platform is in a followup mode (i. e. , follows the maneuver) and if control is switched back to the launch vehicle, it maintains the vehicle attitude at the time of switch.

d. This is only for the earth orbit coast mode for Saturn IB. [For the Saturn V this interface exists for the earth orbit and post-injection coast modes. Additionally, it is the interface for L/V to S/C guidance switch-over (while in earth orbit coast mode) only in the case of L/V platform failure while in earth orbit. This requirement is reflected in the Apollo Specification Document and the Flight Mechanics Panel is presently working on verification of the feasibility of utilizing this aspect of the interface.]

The launch vehicle interface exists in AS-206 and subs (since 206 is a LM alone mission the effectivity is commonly referenced to 207).

The spacecraft interface is available in Block II spacecraft only.

As a result of the 204 accident, we now have a Block II spacecraft (CSM-101) on 205 rather than the previously assigned Block I spacecraft. Consequently, the astronauts would be able to exercise this interface on 205 if the IU changes are made and it is decided that it should be exercised.

It appears that the impact would be Astrionics/IBM to make the circuit changes and Apollo panels to update the interface documentation.

R-ASTR, R-AERO and R-TO agree that the modification to the SA-205 launch vehicle is technically feasible. This interface will be discussed in the Flight Mechanics Panel Meeting scheduled for July 12 and 13, 1967.

Fred Wenzel

RECEIVED JUN 30 1967 R-DIR

NOTES 6/19/67 TEIR

6/19 WB B 6/26

SATURN IB LAUNCH VEHICLE COST: We have been working to develop the delta cost of manufacturing an occasional Saturn IB launch vehicle over and above those required for the Apollo Applications Program in the time-frame of FY 71/75. This effort has been initiated by informal discussions with OSSA personnel (Vince Johnson) and others in Headquarters to provide launch vehicles for OSSA experiments at only the delta cost. This delta cost will be determined by the standard 4 x 4 production rate for the Saturn IB and V as well as the delta cost based on producing the Saturn IB as a spinoff effect under the Saturn V Program. This effort supports your discussion with Dr. Mueller last Friday and the follow-up letter which we prepared.

SA-206 DELIVERY DATE: We requested a change from Mr. Skaggs (Gen. Phillips Program Control Office) on the proposed delivery date of 206 from December 15, 1967 to the end of January 1968 in order to assure that the delivery occurs after the decision point of SA-503 versus SA-206/7, which occurs after the launch of SA-502. Mr. Skaggs tentatively agreed and the change is being incorporated in Program Directive 4G which is still unsigned. Mr. Skaggs advised us that the LM-1 delivery now looks good for June 28 or earlier.

SA-204/LM-1 PULL TEST: A combined static and dynamic pull test is currently scheduled to begin at 8:00 PM on June 22 at KSC. It is expected to run for nine hours.

SA-206 BACKUP S-IVB RESTART MISSION: The R&DO in-house effort to develop requirements for this mission have been defined and it appears that approximately 16 weeks' work will be required. If all goes well, at the end of that time we will be at the 3 month decision point for flying the mission. We should be ready then by approximately the year's end to perform the mission if necessary. This schedule is based on a nominal working period and could be reduced by a priority effort.

SA-205 ATTITUDE CONTROL SWITCHOVER CAPABILITY: We have received an official request from George Low asking that MSFC provide the capability of spacecraft takeover of guidance control on SA-205. The capability is currently provided in SA-207 and subsequent. We understand that although this will be a sizable change, it may be feasible to introduce it without a schedule impact. We will pursue this with Astrionics.

* Weaver is taking care of this with L. Richard. [illegible] 6/28

H. Weidner — URGENT

Isn't this what we've been concerned about all along? Next step will be no I.U. guidance during Sat V [illegible] injection burn! Please develop a formal position of Astrionics, R&DO and IB office.

B

B 6/26

NOTES 6/19/67 BALCH

6/19 NS

S-II A-1 Test Stand - Integrated test of stand and GSE with simulated stage was started on 6/14/67 and completed on 6/16/67. Primary objective was facility hydrogen system checkout, and secondary objective was GSE systems checkout in static firing mode. No problems were encountered in the facility checkout. During facility/GSE simulated countdown and static firing on 6/16/67, minor discrepancies were indicated in connection with the LH_2 heat exchanger. It is expected that an ambient checkout will verify these discrepancies.

S-IC-5 Stage - Additional time required by Rocketdyne for checkout of newly installed Engines 3 and 5 caused two-day delay in shipment of stage from Michoud to MTF. Stage is now scheduled to arrive at MTF on 6/21/67 and to be installed in the test stand the following day.

S-II-3 Stage - Stage is still expected to arrive at MTF on 7/29/67.

Air Force Procurement of Helium and RP-1 - A meeting was held at MTF on 6/13/67 of representatives from Air Force, MSFC, and MTF to resolve operational and fiscal procedures to be effective on 7/1/67, when Air Force assumes responsibility for central procurement of helium and RP-1. Satisfactory arrangements were consummated whereby MTF will take all actions directly with Air Force relative to funding, ordering, and scheduling deliveries of helium and RP-1 for MTF.

Power Interruptions - Lightning strokes on the 13.8K electrical distribution system at MTF caused a series of momentary power interruptions on the entire system on 6/14/67. The S-11 A-1 test stand lost all power, but power was restored at 4:55 p.m. The lightning damaged a lightning arrestor and fused cut-out near the LOX storage area.

Test Stand Derricks - Corrective action is continuing on the S-IC test stand main and auxiliary derricks. On the S-II test stand derricks, no electrical control problems have been encountered similar to those on the S-IC stand.

GE Support Contract - Negotiations on first quarter of FY-1968 have been completed, and contract file is being prepared for transmittal to MSFC for approval. Estimated cost negotiated for first quarter of FY-1968 was $8,009,800, with fixed fee of $398,000

B 6/20

NOTES 6/19/67 BELEW

6/19/67

MISSION PLANNING TASK FORCE (MPTF): As a result of the presentations at the 67-4 MPTF meeting on June 1 and 2, Mr. Mathews requested that a presentation be prepared for Dr. Mueller and the Center Directors (about second week in July) on our studies of the low earth orbit missions scheduled for CY 1970 (Ref ML-6).

Headquarters has assigned to MSFC the following action assignments, including presentations: (1) Baseline Mission Profiles and Performance Summary; (2) Orbital Workshop Configuration and Subsystem Performance; (3) ATM Experiments and Payload Carriers; (4) Experiments and Payload Carriers; (5) Cost and Schedules. These actions are underway and a preliminary review with MSFC will be held on July 7.

ATM H-ALPHA TELESCOPES: Lockheed, Perkin-Elmer, ITEK, and Spectrolab have responded to the ATM H-Alpha Telescope Request for Procurement (RFP). Plans are to have this effort under contract by July 15.

ATM RACK/LM MECHANICAL INTERFACE: As previously reported, MSC defined to GAEC an interface plane of X-200, which is only about 1/2" above our rack structure. Since we already have numerous components which infringe into this zone, we asked the mechanical panel to negotiate an equitable arrangement. An ad hoc group designated by the mechanical panel met on June 13 to discuss the interface. The primary results of subject meeting were: (1) both centers will determine a position within two weeks relative to ATM components protruding above the X-200 station; (2) GAEC will plan to mount RCS deflectors on the LM ascent stage in lieu of mounting them on the rack; and (3) for LM/ATM separation capability, the existing LM guillotine cable cutters will be utilized.

ORBITAL WORKSHOP TEST PLAN STATUS: A meeting was held June 15 to review the Orbital Workshop Test Plan Status. The meeting representatives from R-P&VE, I-S/AA and MAC/DAC reviewed the status of the preparation of the General Test Plan for AAP-2 including the MDA and Orbital Workshop. MAC/DAC is presently working on the Development Test Plan for the Orbital Workshop. This effort will be expanded to direct MAC/DAC to prepare a General Test Plan for the Orbital Workshop, and it is expected to be completed, in preliminary form, by July 12.

GENERAL: Based on the discussions with Dr. Mueller and Mr. Mathews on Saturday (June 17), it appears that MSFC will have to carefully re-examine all aspects of the proposed AAP program to see what is really the minimum program to live within dollar limitations. This will mean a close scrutiny of module and experiments to reduce requirements and simplify integration. Since it appears that Mr. Mathews will be restricting FY-68 procurement, we will have to undertake this urgently to determine the critical needs for new procurement.

NOTES 6-19-67 BROWN

B 6/26

6/19 NTS

F-1 ENGINE Timely engine delivery for the Apollo Applications Program will be jeopardized if relief from the verbal instructions issued to this Center on April 13, 1967, by NASA Headquarters is not received this week. Negotiations were completed on May 31, 1967, for F-1 engine long lead time hardware. This procurement of long lead time hardware is an urgent requirement to enable the F-1 Engine Project Office to meet the M(P) -4 Schedule and is now 2 1/2 months late based on the contractor's proposal.

B.B. You should have had relief by now B

If the FY 67 AAP fund authorization (in the amount of $1.3M) for the long lead time F-1 engine hardware is not obligated by June 21, 1967, the funding will be returned to the AAP Office to allow obligation in this fiscal year. ✓

As reported previously in the notes of 5/8/67, two engines on vehicle S-IC-5 and two engines on S-IC-6 were found to have turbopump primary LOX seals containing carbon from an abnormal lot. An analysis indicates that the suspect carbon lot was responsible for excessive heating and mating ring cracking experienced in R&D engines. Installation of a spare engine on June 19, 1967 in S-IC-5 will complete the replacement of all defective seals. ✓

J-2 ENGINE The acceptance test of S-IVB stage 209 scheduled for Wednesday, June 14, was postponed approximately one week after two aborts occurred in the countdown. The first abort was a procedural one involving the reusable ignition detector probe. A computer monitor of pre-fire conditions indicated main chamber ignition. Hot thrust chamber helium purge gas had heated the probe causing it to indicate an open circuit and hence, ignition. Had the countdown continued, cold helium thrust chamber chill gas would have eliminated the problem. The countdown was resumed and later aborted again when a GSE problem affected the recirculation system. ✓

All main LOX valves for AS-501 have been returned to KSC. Four of the six helium regulators have been returned and the remaining two are scheduled to arrive on June 19, 1967. The ECA for S-IVB-501 is scheduled for shipment from Rocketdyne on June 19, 1967. This will complete scheduled component rework for 501 mentioned in last week's notes. ✓

GENERAL On June 6, 1967, Rocketdyne was awarded a contract for development of the "Mansat" engine. The liquid fluorine-liquid hydrogen engine will deliver 30,000 pounds thrust and be throttleable to 10,000 pounds. Basically it is an aerospike configuration with a smaller bell-shaped chamber inside the aerospike. ✓

Is this a Lewis contract?

B

NOTES 6/19/67 CONSTAN

6/19/67

B 6/26

Special visitors to the Michoud Assembly Facility this week included six Bolivian Congressmen, 50 representatives of the National Press Photographers Association and 41 Japanese Trade Center representatives. An average of about 2000 visitors are now touring Michoud each month. ✓

NOTES 6/19/67 FELLOWS

6/19/67S

B 6/20

Logistics Management Training: As reported in my NOTES 4/3/67 (attached), the University of Alabama had consummated an arrangement with Ohio State University to conduct a one-week logistics course this summer. Final arrangements have been made for the course entitled "Logistics Engineering as an Aspect of Systems Management" to be offered the week of August 7 - 11, during normal duty hours. Although the formal announcement will be made this week, the University has informally indicated that some 70 individuals employed in the local Army establishment have already evidenced a positive interest in attending this logistics course. Since classroom attendance will be limited to approximately 35, priorities will be established so that Army, industry, and Marshall employees can be afforded appropriate representation in this one-week course. The University of Alabama has in their contract with Ohio State a mutual option arrangement for 2 one-week follow-on courses. The exercise of those options, which expire June 30, 1968, is dependent on attendance and interest in this first course and follow-on interest expressed to the University of Alabama.

NOTES 6/19/67 GEISSLER

6/19/67 B 6/26

1. Safe Abort Criteria Problem: Recent studies initiated to investigate the structural capability of the launch vehicle when an abort sequence was initiated have revealed that failure will occur during thrust decay ($\approx$ 0.5 sec. after cutoff or abort initiation) for angles-of-attack above approximately 6 degrees. Critical time for this occurrence is about 40 to 90 seconds after lift-off and is essentially independent of the type of malfunction. Since manual abort by the crew is not initiated unless angle-of-attack is greater than 10 degrees, this virtually assures a structural limit being exceeded during thrust decay for an all engine cutoff in this flight region (40 - 90 seconds). Automatic aborts, resulting from two engines out or saturated control signals, may occur at angles-of-attack between 0 and 10.5 degrees. However, these automatic abort situations have a relatively low probability of occurrence. A safe abort of the command module is presently considered to be approximately 300 to 350 feet separation distance from the LV at the time an explosion occurs (altitude dependent). This separation distance is achieved at about 3 to 3.5 seconds after cutoff with the presently configured S/C. Latest indications from MSC are that the period from 75 to 90 sec. after lift-off may be considerably less restrictive with respect to safe separation distance. Additional data will be obtained from MSC in the next two weeks. Additional weight increases of the CM will increase the time required to achieve a safe separation distance. If it is assumed that an explosion occurs as late as 1 second after start of the vehicle to yield, a separation distance of about 75 feet would be achieved. These results indicate that a safe abo abort distance, within present criteria, will not be achieved for aborts initiated in the flight period of 40 to 90 seconds. This problem has been coordinated with P&VE, Saturn V Program Office and R-TO. Work is underway to investigate this more thoroughly. Possible solutions, if required, are: wind limiting, planned separation of stage or stages at abort initiation to relieve loads on the total configuration, sensing of failures and aborting and/or switching to backup systems. Additional studies, to determine the probable time of explosion after a joint failure, are being made.

2. CM-SM Interface: After more than three years of sporadic exchanges of information with MSC regarding the inadequacies of the CM-SM connection rods, and requests on our part to have these deficiencies corrected, MSC has agreed to change the design. We welcome this decision but must add that the change has come after completion of a very expensive dynamic test program using the old design. MSC now requests a repeat of several test conditions to check the design dynamically. In our judgement our analytical techniques have been checked well enough on the old design to be extended to the new design with only limited check points of additional testing. The Control Dynamics and Structural Feedback Committee will determine requirements for such additional testing.

NOTES 6-19-67 GRAU

6/1995

B 6/26

1. S-IC-8 WELD DEFECTS: A meeting between MSFC and Boeing personnel was held June 14, 1967, to discuss the weld defects discovered on the S-IC-8 fuel tank after hydrostatic proof test. A decision was made to repeat the proof test, without any repair, and subject the tank to ten maximum operating cycles with inspection after the fifth and tenth cycles. If growth of crack is normal the tank will be repaired, retested, and put back on the assembly line. Since the main concern is whether we are experiencing an abnormal crack growth, if the test is successful there will be no action required on S-IC-1. ✓

D.F. Does SD now use three-dimensional jigs for their cable harness manufacture? A B

2. S-II PROGRAM: The SD response to the cable/wiring problems has been good. SD manufacturing has taken the initiative to inspect S-II-4 and S-II-5 cable installations and tag all of the discrepancies which could be found. Engineering was requested to develop fixes for the design type problems. Workmanship type problems are being reworked. All of this is being done prior to turning the stages over to SD Quality Control for inspection. ✓

3. NONDESTRUCTIVE TESTING: Personnel of this Laboratory visited Electrogen Industries, Westbury, New York, to perform a preliminary evaluation of a new, proprietary instrument believed to be applicable to nondestructive test requirements of spray-on foam thermal insulation developed for the S-II stage. The instrument was designed to measure the electric field intensity existent in or near materials. Tests were performed on NASA furnished specimens consisting of foam bonded to an aluminum sheet. Definite meter deviations were observed at concealed points which were later revealed to contain surface and subsurface voids. A feasibility study of this technique is being pursued through attempts to obtain the instrument for evaluation here at MSFC. ✓

I thought it was near-scandalous that in 1967 a reputed aero-space contractor still decided he could do without them!

NOTES 6/19/67 HAEUSSERMANN

6/19/67

B 6/26

No submission this week.

NOTES 6/19/67 HEIMBURG

6/19/67S

B 6/26

MODERATE DEPTH LUNAR DRILL PROJECT

Negotiations were held with Westinghouse Electric Corporation on June 15, 1967. All technical problems on this scope of work were solved and now only the legal aspects remain. With luck all three contracts (Westinghouse, Northrop and Joy Manufacturing) should be finalized by the end of the month. We have been told by Advanced Systems Office that there will be no fifth quarter extension on FY 67 funds if we cannot obligate by June 30, 1967.

S-IC STAGE (MTF)

The S-IC-5 stage is now expected to arrive at MTF on June 21, 1967, and will be installed in the test stand on June 22, 1967.

S-IC STAGE (MSFC)

Connection of support equipment and facility systems to the S-IC-T stage is continuing. Stage systems checkouts are scheduled to begin around July 1, 1967. Design modifications to the S-IC pneumatic console are in progress.

S-II STRUCTURAL TEST PROGRAM

Phase I construction work is progressing with installation of the 20 gaseous hydrogen bottles completed last week.

S-IVB (SACTO)

Two unsuccessful attempts were made to acceptance fire S-IVB-209 on Wednesday, June 14, 1967. The first attempt was aborted at T-750 seconds by the Safety Item Monitor due to an erroneous signal from the re-startable ignition detect probe. The second attempt was aborted due to no talk-back from the chilldown pump "off" command caused by an intermittant relay failure. Subsequent post-test investigations have failed to repeat the failure although the investigation is continuing. DAC plans to fire again on June 20, 1967.

S-IVB-504 (New)

S-IVB-504 (New) arrived at the Sacramento Test Center on Thursday, June 15, 1967. DAC has not released a schedule, but the acceptance firing will probably be about August 16, 1967.

ACCIDENT AT CTL

The Board is still investigating the cause of the accident. Nothing new can be reported since your visit last week.

SATURN V SWING ARMS

Arms 6 and 4 were returned to the "Arm Farm" on June 14 and 16, respectively, for continued testing on Lanyard Modifications after completing cold shock, pressure, and water flow tests on lox lines. The problem of hinge pin rubbing on bellows is to be solved by replacing bellows with hard line. (Ref. 5/22/67 Notes) Both propellant hard lines on Arm 6 are to be returned to manufacturer, Straza, for rework of hinge joints and reinspection of expansion bellows. KSC has Boeing re-evaluating all expansion joints for all propellant servicing lines.

4.

B 6/26

NOTES 6-19-67 HOELZER
6/19/67

STATUS OF THIRD GENERATION COMPUTER INSTALLATION: On April 10, 1967, a letter was received from UNIVAC stating that software to be delivered in accordance with Contract NAS8-18404 would not be operational as of the scheduled delivery dates of June 1, 1967, at Huntsville, and May 1, 1967, at Slidell.

An investigation into the problem areas was launched immediately to verify the length of slippage by UNIVAC as being six to eight months. This verification was made and presented to the Management Decision Committee for direction.

The Committee set up ground rules for the establishment of a Recovery Plan and the subsequent negotiation with UNIVAC on the slippage and associated damages called forth in the contract. The results of the negotiation and establishment of the plan were presented to the Management Decision Committee for approval.

Eberhard R

The presentation of these results included a budget impact analysis that revealed an increase in computer rentals in FY-69 due to the slippage. It has always been intended that the purchase option in the contract would be exercised at the beginning of FY-69 after all equipment has been installed and has operated successfully. The slippage would require leasing in FY-69 until these conditions would be reached. A corresponding decrease is anticipated in FY-68 with a total impact for the two fiscal years being around $78,000.

In view of expected FY 68 cuts in AO we should seriously study the feasibility of postponing the entire 3rd generation computer acquisition. Please look into this and advise B

The plan takes advantage of interim equipment to be installed rent-free by UNIVAC. It requires slipping 7010 #1 two months instead of seven and 7010 #2-7740 six months instead of seven. All other systems are slipped seven months.

The new schedule is as follows:

(Interim)	Phase A - July 1, 1967
(Interim)	Phase B - October 1, 1967
	Phase I - February 1, 1968
	Phase IIA - May 1, 1968
	Phase IIB - August 1, 1968
	Phase III - November 1, 1968

6/19/67 WKH Notes

Phases I through III are presently defined in the contract.

All terms and conditions of the present contract remain in force with a new total amount of liquidated damages applied to the new schedule of $3 million.

Approval of these results has been given by the Management Decision Committee and preparations are in process for installation of Phase A. This equipment is being shipped June 15, 1967, and is expected to arrive on June 19, 1967.

B 6/26

NOTES 6-19-67 JOHNSON

6/19/67

SRT/ART PROGRAM PLANNING AND EXECUTION: In the Experiments Office Briefing to you 5/1/67 on the status and planning of the Center's consolidated SRT Program you expressed a strong interest in the planning and execution of that Program reflecting a more direct relationship to the objectives and requirements of current, newly assigned and anticipated (proposed) mainstream programs of the Center. During the ensuing weeks a number of events have occurred which will systematically provide timely inputs to improve overall effectiveness of program planning and execution.

- Advanced Research and Technology (ART): Realizing that a truly effective and properly balanced SRT Program must be "flavored" with ART inputs, EO and lab representatives have had discussions with ERC representatives (Dr. Van Meter and some of his people) in the computer and related subsystems areas. On 6/13 Mr. Neil Patt conducted a briefing here on memories research activities at ERC and under contract. The session was well attended by lab personnel. Serving as the Inter-Center Research Coordinator, EO in collaboration with the labs will plan follow-on sessions with ERC and establish similar series (in other fields) with Centers having common interests with MSFC.

- Current Mainstream Programs: Mr. Miles, Chief, Research Programs Office, has intensified liaison with Hqrs. Program Offices and has conducted numerous reviews of MSFC's FY68 requirements with personnel of participating Program Offices in advance of the official submission. This has helped us shape the Center's submission to more nearly match the overall plans as seen by Hqrs.

- Newly Assigned Programs: Mr. Harry Coons, Deputy Chief, Research Programs Office, EO, is MSFC representative on the Voyager Technology Panel. The formulation of MSFC's requirements is being done in collaboration with the labs, Advanced Systems Office, and Technical Systems Office.

- Anticipated (Proposed) Mainstream Programs: In collaboration with Advanced Systems Office we are formulating an SRT Program for the Long Term Space Station.

- Lab Director Reviews of SRT Tasks: Dr. Haeussermann has scheduled a series of reviews and has invited participation from EO. The benefits of such a plan are obvious and it is planned to establish similar arrangements with the other labs.

- SRT Policy Memo: This memo, which you signed 6/14, will serve to emphasize the need and importance of a sound and objective SRT Program and defines how the program is to be planned and executed.

NOTES 6-19-67 KUERS

6/19 PS

B 6/26

Manufacturing Backup Program for S-II Girth Welds: In order to gain additional assurance for the reliability and quality of pulsed-arc welded structures in comparison with TIG welded structures we have proposed to establish the following hardware and test program at MSFC:

W.K. Is the material identical to that used in the SII? B

1. Utilize existing Titan III oxidizer tanks (10 ft. dia.) a number of which are presently available as excess material and can be obtained from the Air Force at no cost.

2. Modify these tanks by cutting the domes off and welding one new cylindrical section between the domes, using the TIG welding process as presently applied by S&ID for one girth weld and the pulsed-arc welding process for the second girth weld on each container. The weld lands of these containers are within a few thousandths of an inch identical to the LH_2 dome to cylinder #6 weld of the S-II.

3. Subject these modified tanks to hydrostatic and cryogenic tests. The containers will be spray foam insulated for this purpose with removable close-out insulation segments on the girth welds. Pressures applied to the containers would be such as to simulate load conditions created by internal pressure at cryogenic temperature as closely as possible to the S-II LH_2 container. Thorough inspection will be made after completion of each test.

4. The objective of these tests is to obtain additional data and experience on the behavior of welds made by both processes and subjected to identical life and test cycles. Manufacturing techniques cannot be evaluated using a single test specimen because consistency and controllability of process are important factors to be evaluated in a process.

5. If the Titan III containers should not be suitable for the intended purpose we would propose to procure a minimum of 4 bulkheads of similar size for use in a test fixture for evaluation and comparison of girth welds made by different welding techniques.

NOTES 6-19-67 LUCAS

6/1990's

1. S-IC WELD CRACK: Because of cracks found in welds of S-IC-508 after hydrostatic test, an extensive test program has been started to hydrostatically stress the S-IC-508 tank to demonstrate that the defects will not propagate.

2. S-II PNEUMATIC CONSOLE SET (S7-41): The unstacking of S-II-1 at KSC postponed the lox and LH_2 actuation ventdown tests for a minimum of one month. Since these tests and any resulting equipment modifications are mandatory prior to SA-501 flight, the S7-41 pneumatic console set located at MSFC Mechanical Automated Breadboard is being utilized for these tests.

3. SATURN V DTV: As a result of data generated by Saturn V DTV testing, MSC has decided to modify the Command/Service Module interface structure on all flight vehicles. This modification will consist of four additional torsion struts on vehicles 501 and 502 (for a total of five struts) and five additional struts on 503 and subs (for a total of six struts). The increased torsional stiffness of the modified structure will invalidate certain data from our previous tests, requiring some retesting.

4. RESTARTABLE BURNER: A test program was completed at Sacramento which demonstrated the feasibility of the restartable burner ignitor/injector configuration. Over 60 tests were run and all were successful except for a couple of early cutoffs due to cracked ceramic material which surrounded the electrode. Restarts from approximately one minute up to several days between ignitions with run durations from several minutes to approximately twenty-five minutes were conducted. The normal flight mission duty cycle will be about four minutes. The restartable burner is to be incorporated into S-IVB-503 and subs.

5. NGTM: The NGTM Design Status Meeting held on 6-12-67 was attended by the SNPO Manager (Mr. Klein) and staff members. Reviewed were: vehicle configuration, suction line design, valves, engine-to-stage interface, nuclear radiation environment, material radiation effects, structural design concept, documentation, instrumentation development, and stage input for design study on advanced nuclear engine static test facility. The SNPO Manager and staff were well pleased with the NGTM status, effort to date, and the timeliness of the NGTM input to the test facility design study and the NERVA. SNPO representatives indicated this week that agreement has been reached on a thrust level of 200K for the advanced nuclear engine.

6. MICROMETEOROID SIMULATION DEVICE: The micrometeoroid simulation device procured under Contract NAS8-20529 with Canadian Commercial Corporation has been delivered, installed, and successfully test fired.

7. ATM CONTROL MOMENT GYRO LUBRICATION: We have completed our testing of dry film lubricated gear train and bearings for the ATM Control Moment Gyros. All tests were successful. We will now test the entire subassembly in a simulated environment.

B 6/28

NOTES/6/19/67/MAUS
6/19/67

VISIT BY A COMMITTEE OF THE NATIONAL ACADEMY OF SCIENCES

The request by the Life Sciences Committee of the Space Science Board of the National Academy of Sciences to meet at Marshall in late June has been agreed to. They will meet on June 26 in their own regular session with Marshall supplying the meeting place and administrative arrangements. On June 27, MSF and MSFC will make presentations and a tour of the S-IVB Mock-up area will be provided. Dr. Vinograd, Office of Space Medicine, is the MSF coordinator. A meeting to discuss the agenda for the portion involving Marshall presentations will be held during the week of June 19.

BOB VISIT TO MSFC - A planning meeting was held with representatives from the various MSFC elements to prepare an agenda for the visit by the BOB team headed by Mr. Don Crabill. Advance information from Headquarters is that they will be here the week of July 10. Information as to what they discussed at MSC is sketchy, but we hope to get detailed information on their principal areas of interest when we get an approved agenda back from Headquarters.

B 6/26

NOTES 6/19/67 RICHARD

6/19 PS

Overall Testing with KSC: We have solved the incompatibility between the spacecraft system and the launch vehicle, which we mentioned in last week's NOTES. We have a three-center agreement on the approach. The impact was on MSC. The specific problem had to do with the real time deviation of the separation command given to the spacecraft system on the Flight Readiness Test. We have given MSC a time and a tolerance that they can live with.

NOTES 6/19/67 RUDOLPH

6/19 9 TS

B 6/26

1. AS-501 at KSC:

   o S-II-1 Stage:

   - All dye penetrant and x-ray inspections have been completed.
   - Minor flaws found were grooved out.
   - Defective LH_2 feedlines were replaced and;
   - Stage was re-stacked on Sunday, 18 June 67.

   o S-IVB and IU Stages are scheduled to be erected today, Monday, 19 June 67.

   o Roll-out of AS-501 is scheduled for Monday, 7 August 67.

2. S-II-2 Stage at KSC:

   o Dye penetrant and x-ray inspections of the LOX tank were completed on Tuesday, 13 June 67.

   o Only two small flaws were found - these have been repaired.

3. S-IC-8 Stage at Michoud:

   o A dye pentrant inspection was made on the S-IC-8 fuel tank after hydrostatic testing and minor weld flaws were detected.

   o This is the first S-IC Stage which was dye penetrant inspected after hydrostatic testing.

   o Additional pressure cycles will be made on fuel tank to determine propagation characteristics of flaws.

   o Above testing to be completed about Wednesday, 28 June 67.

NOTES 6/19/67 SPEER

6/19 RS

B 6/26

1. AS-501 LAUNCH WINDOW: During the AS-501 Program Manager's Pre-Flight Review (PMPFR), we expressed concern over the relatively short duration (≈ 3 hr) of the launch window established in the current Launch Mission Rules for an August launch. The governing constraint was an MSC requirement to control spacecraft attitude geometry with respect to the sun, in order to obtain optimum thermal conditioning of the reentry heat shield. We have made an attempt to increase the window. I now understand from Gen. Bolender that MSC is unwilling to relax this specific test requirement, which permits approximately a four hour window for the current launch date with a given set of spacecraft solar soak attitudes. However, the window could possibly be extended to the approximately seven hour limit imposed by recovery lighting requirements by changing the spacecraft solar soak attitude parameters set during the countdown, if the predicted launch time fell beyond four hours, the applicability of the first nominal set. MSC is analyzing this possibility. I will continue to work the problem with I-V and the other elements concerned.

F.S. Keep pushing this! B

2. AS-501 SECOND BURN: We have been advised that MSC will insist on inhibiting the second S-IVB burn on AS-501 if there are indications for engine hardover. This (very unlikely) condition would lead to S/C structural failure within 11 sec and this time is too short to assure proper ground command action after ignition. Dr. Rudolph and I feel that we cannot disagree with MSC's determination to bring the S/C home under any condition, even if this compromises other mission objectives; however, we are looking into all possibilities to (a) complete the ignition sequence with ignition and at least a very short burn and (b) make all measurements involved in this decision most reliable (R-TO has lead action).

3. MSC OPERATIONS WORKING GROUP (AAP): Kraft has established a new Ad Hoc Working Group for AAP Data Flow. The group will be chaired by MSC (Beers) and is basically designed as inhouse tool of the Flight Operations Directorate (FOD). However, participation by other Centers including MSFC is invited. Four Subgroups are being proposed which - if successful - would make the FOD largely independent of the AAP panel structure.

Want to try it, before we object to this setup as inadequate for our needs?

B

NOTES 6/19/67 STUHLINGER

6/19/67

1. ATM - FILM DAMAGE BY RADIATION: Although some of our experimental data are not yet fully evaluated, we have sufficient information now to state the severity of the problem. Two experiments (HAO and HCO) will just be able to live with the radiation environment; the others (NRL, AS&E, and GSFC) will receive too much dosis by factors of 10 to 20. An inhouse meeting will be held this week to discuss various ways to alleviate the problem. No easy solution is in sight. The most natural remedy, accepting less sensitive emulsions and longer exposure times, would reduce the total observation times considerably, and would also require repeated exposure of the same image during subsequent orbits. We will keep you posted on our progress.

2. PRESENTATION OF VOYAGER SCIENCE PROGRAM TO LUNAR AND PLANETARY MISSIONS PLANNING BOARD (LPMPB): Dan Hale and I were asked by Dr. John Findlay, Chairman of the LPMPB, to present our "hypothetical scientific package for the Voyager spacecraft" to the Board on June 17. Newell, Naugle, Nicks, Foster, Liddell, Hearth, and Fellows were also present. Very lively discussions developed on such problems as total weight allowance for science; photographic cameras versus other instruments; picture resolution versus coverage; desirability of a subsatellite; coordination between spacecraft experimenters and lander experimenters; engineering leadtimes versus flexibility; and payload complexity versus mission success. Matters of considerable concern to the Board include the long leadtimes required for the flight experimenters (they wish to use Mariner 1969 results to define Voyager 1973 experiments!) and the fact that potential PI's from inside NASA might use proposals from outside experimenters to further their own experiment proposals. It was pointed out, however, that the prospect of possibly becoming a PI for a flight experiment is one of the reasons why scientists decide to join NASA, and to do all the tedious footwork which is necessary to bring a space flight project to life.

Hale's presentation was received with great interest by the LPMPB, and by members of the OSSA Voyager Program Office. Requests for more presentations of this kind are expected as the project develops further.

NOTES 6/19/67 TEIR

6/19/67S

B 6/25

SATURN IB LAUNCH VEHICLE COST: We have been working to develop the delta cost of manufacturing an occasional Saturn IB launch vehicle over and above those required for the Apollo Applications Program in the time-frame of FY 71/75. This effort has been initiated by informal discussions with OSSA personnel (Vince Johnson) and others in Headquarters to provide launch vehicles for OSSA experiments at only the delta cost. This delta cost will be determined by the standard 4 x 4 production rate for the Saturn IB and V as well as the delta cost based on producing the Saturn IB as a spinoff effect under the Saturn V Program. This effort supports your discussion with Dr. Mueller last Friday and the follow-up letter which we prepared. ✓

SA-206 DELIVERY DATE: We requested a change from Mr. Skaggs (Gen. Phillips Program Control Office) on the proposed delivery date of 206 from December 15, 1967 to the end of January 1968 in order to assure that the delivery occurs after the decision point of SA-503 versus SA-206/7, which occurs after the launch of SA-502. Mr. Skaggs tentatively agreed and the change is being incorporated in Program Directive 4G which is still unsigned. Mr. Skaggs advised us that the LM-1 delivery now looks good for June 28 or earlier. ✓

SA-204/LM-1 PULL TEST: A combined static and dynamic pull test is currently scheduled to begin at 8:00 PM on June 22 at KSC. It is expected to run for nine hours. ✓

SA-206 BACKUP S-IVB RESTART MISSION: The R&DO in-house effort to develop requirements for this mission have been defined and it appears that approximately 16 weeks' work will be required. If all goes well, at the end of that time we will be at the 3 month decision point for flying the mission. We should be ready then by approximately the year's end to perform the mission if necessary. This schedule is based on a nominal working period and could be reduced by a priority effort. ✓

SA-205 ATTITUDE CONTROL SWITCHOVER CAPABILITY: We have received an official request from George Low asking that MSFC provide the capability of spacecraft takeover of guidance control on SA-205. The capability is currently provided in SA-207 and subsequent. We understand that although this will be a sizable change, it may be feasible to introduce it without a schedule impact. We will pursue this with Astrionics. ✓

URGENT

H. Seidues

Isn't this what we've been concerned about all along?
Next step will be no I.U. guidance during Sat V
trans injection burn! Please develop a formal position of R&DO Astronics, Spacecraft and IB office

B

NOTES 6/19/67 WILLIAMS

6/19 9:15

B 6/20

1. Early Orbit Space Station:

a. A group of advanced workshop study people attended three days of briefings at MSC:

June 13 - Basic Subsystems Module Study - GD/C
June 14 - Saturn V Brute Force Space Station Study - Boeing
June 15 - Logistics Study - MAC

The most significant single point made clear by these mid-term briefings was that any Saturn V launch ground-fitted workshop must be very rudimentary, utilize redundancy with the existing subsystems, and probably consider only experiments that are under development or very close to the initiation of development if a 1971/72 flight date is to be met and the costs are not to become unreasonable. The Boeing study was supposed to be competitive with the MSFC DAC study on the advanced workshop. However, at this mid-term point, Boeing was proposing a 33' diameter, 2-floor station supported by a newly developed basic subsystem model (15" diameter). This resulted in a very high price tag and a late 1973 launch date. ✓

b. The DAC mid-term presentation on the advanced workshop study will be June 21 at Huntington Beach. Since we have monitored this effort rather closely, we expect the configuration to be more in conformance with the 1971 launch opportunity. After this presentation, a management summary for all four studies will be presented to Mr. Weidner and Mr. Lee Belew. Perhaps you would be interested in the abbreviated version of that presentation during the week of June 26. ✓

2. Pogo:

The flight tests at LaRC have proceeded exceptionally well this week. Bell should have completed their soft-suit flights Friday, June 16, and will begin hard-suit flights today, June 19, or tomorrow, June 20. No new problems have developed in flying the soft suits. The pilot reports conditions very similar to shirtsleeve flights. Some flight cues are missing, such as wind in face, ruffle of clothing; however, communications are improved since the pilot is enclosed thereby reducing external noise level. No problems are anticipated in hard-suit flights. ✓

June 26, 1967

6/26/67 w/ comments Gorman

NOTES
MR. GORMAN'S COPY w/ Comments
JUN 2 6 1967

No comment directed
to DEP-A

B 7/1

NOTES 6/26/67 BALCH

6/26 9PB

S-IC-5 Testing - Stage arrived at MTF at 10:15 p.m., 6/21/67. An attempt on Thursday, 6/22/67, to install the stage in the test stand failed because of malfunction of the main derrick. Trouble with derrick was traced to incomplete recent installation of control circuitry to an amplifier, which caused amplifier to "drift." Problem was eliminated by installation of a "pre-conditioning" circuit. Complete checkout of control circuitry was performed Thursday night, and no deficiencies were noted. Functional checkout and proofloading of main and auxiliary derricks was performed Friday, with no problems encountered. Stage is now scheduled to be installed in the test stand late today. Current plans call for propellant load test on 7/14/67 and static firing on 7/25/67. Review of S-IC-5 End Item Test Plan has been completed, and comments have been submitted. ✓

S-II-3 Stage - S-II A-1 test stand is ready to receive the S-II-3 stage, which is still expected to arrive at MTF on 7/29/67. ✓

GE Support Contract for First Quarter of FY 1968 - Contract file was handcarried to MSFC on 6/21/67 for review and approval by MSFC and NASA Headquarters. ✓

Utilities Agreements - Terms of contracts for telephone services and for natural gas at MTF have been amended to provide coverage through 6/30/68. ✓

Expected Visit of Dr. Seamans - I am expecting you and Dr. Seamans at MTF late tomorrow afternoon. You will be met at Gulfport, Mississippi, as previously planned. ✓

NOTES 6/26/67 BELEW

B 7/1

LUNAR MAPPING & SURVEY SYSTEM (LM&SS) AND DOCKING COLLAR: The first flight article LM&SS Docking Collar was shipped to the Payload Module (PM) contractor June 23, a week ahead of the committed schedule shipping date of June 30.

REAL TIME SIMULATION SUPPORT: We are working with Dr. Speer's office to identify hardware/software that will be available for possible real time support to the mission. This is being coordinated with efforts of the Integrated Test Panel.

ATM ACTION ITEMS RESULTING FROM DR. MUELLER'S JUNE 17 VISIT: A summation of the ATM action items are as follows: (1) provide Dr. Mueller with a detailed ATM equipment list with functions; (2) perform an MSFC assessment of the scientific impact should any one of the ATM experiments fail in flight; (3) assess the design of the HCO and NRL experiments - the purpose of this effort will be to determine if the designs can be simplified and made less sensitive to thermal environment; and (4) perform a detailed ATM budget re-assessment.

In conjunction with Astrionics, we are pulling together the information necessary to fulfill items 1 and 4 above. We have been discussing item 2 with Dr. Stuhlinger. A request has been sent to Dr. Haeussermann to form a team to review the HCO and NRL designs. We have pulled L. Richard and H. Kroeger into this for action.

STATUS OF HEADQUARTERS DIRECTED ATM ACTION ITEMS: Mr. Mathews recently established two ATM action items; (1) the trade-off between vibration telementry equipment mounted in the IU versus mounted on the ATM rack; and (2) a trade-off between the ATM solar array, including retractable versus non-retractable, and state-of-the-art solar arrays. Both items have been completed and are in final preparation.

We are looking for further inputs including the decision of where thermal vacuum tests will be performed and an indication on the availability of ACE to MSFC.

ATM THREE-FOOT IU ADDITION: We have been informed that the Apollo Applications Level 1 CCB approved the addition of a three-foot IU structure to the ATM launch vehicle.

MDA REVIEWS AND BRIEFINGS: A Multiple Docking Adapter (MDA) systems briefing has been scheduled for June 30 at MSFC. This briefing will be an all-day session and will cover each functional area in detail. A similar briefing, shortened to approximately three hours, will be given to MSC and McDonnell Douglas Corporation on July 11 at MSC.

GENERAL: Mr. C. Mathews, by telephone conversation last Friday, stated he had essentially been directed by Dr. Mueller to incorporate the dual floor into the Orbital Workshop. He plans to get this to us officially this week.

Suggest we proposed reappraisal after we know final AAP 68 budget position. B

Lee

Money impact? Looks like the actual FY 68 budget figures for AAP we have to become more frugal rather than more plush. I guess GEM just committed himself to the 2 floors in Congressional testimony. But this testimony served to support the original budget figures. B

NOTES 6-26-67 BROWN

J-2 ENGINE The S-IVB stage 209 was successfully acceptance tested for 455 seconds on June 21, 1967.

Rocketdyne has had a team of engineers at Tempo, the manufacturer of the ECA timers, for the past two weeks reviewing designs and component availability relative to obtaining improved timers for the J-2. A formal vendor survey was conducted in May with a MSFC quality man as a member of the survey team. This survey did not reveal any significant inadequacies. However, due to a relatively high rejection rate in component checkout and three field failures an improved timer design will be pursued. An interim design should be ready for test in August and a final design in December.

H-1 ENGINE Engine H-2038, a 188K engine which has been in storage for four years, has been hot fired at Neosho and transported to MSFC for teardown. The purpose of this teardown is the evaluation of the ageing effect on 200K engine seals and soft goods, which are identical to the 188K engine.

Engine H-156-1 D, which exhibited combustion instability during recent bombing tests, was disassembled and no discrepancies were found. The engine was then modified in an attempt to isolate the cause of the instability. A production-type injector which has continually exhibited stable operation during development bombing tests was installed in the engine to find if the rough combustion could be traced to the original H-156-1 D injector. The engine system was then redesignated H-156-2 D and subjected to another bombing test in which instability again occurred. This indicates that the injector was not the cause for the instability. Additional tests will be run to determine what is instigating this anomaly.

C-1 ENGINE Hardware failure testing of the four Block I configuration Qualification C-1 engines was completed June 24, 1967. The four engines accumulated a total of 64,960 seconds in 365 starts during the Qualification and Hardware Failure testing. Three engines experienced hardware failure at 15,784, 15,844, and 16,254 seconds respectively. One engine did not experience failure after accumulating 17,078 seconds of hot fire testing. All four engines exceeded the minimum 7500-second specification life requirement. All hardware testing has been terminated to permit the orderly close out of the C-1 Engine Program by June 30, 1967.

GENERAL It was learned last week that the critical/sensitive procurement actions withheld by NASA Headquarters are now being released. The most important engine procurements affected by this action include the 60 H-1 engine buy, the procurement of F-1 and J-2 engine long lead hardware for AAP, and the S-IVB ullage motors for vehicle 507 and subs which were in a day-for-day slip as of June 15, 1967 against the DAC requirement schedule. The most serious repercussion may turn out to be the F-1 long lead hardware, the release of which comes 2 1/2 months later than required by lead time consideration. (We'll have to work this one hard to prevent a production gap.)

NOTES 6/26/67 CONSTAN

6/26/68

B 7/1

Nothing of special significance.

NOTES 6/26/67 FELLOWS

6/26/67

B 7/1

R&DO Manpower Management: In a continuing effort to improve manpower planning, we are working closely with the Manpower Utilization and Administration Office (MA) in forecasting FY-68 requirements. As our personnel ceiling becomes stabilized and our workload more diversified, manpower planning is increasingly and more directly associated with the several programs being undertaken and supported by R&DO. Shifts in skill mix, for instance, will in all probability result from even more attention to the careful selection, reassignment, and intensified retraining of personnel toward programs and projects than heretofore when attrition and recruiting could accomplish the desired skill mix. The identification of recruiting requirements, especially for knowledgeable, experienced people, will have to be done on a sufficiently long lead time basis so that the location and selection of new employees can be done in the best possible environment to satisfy our projected program personnel requirements. The objectives of MA and R&DO are identical and, through this joint effort, a sound approach to an FY-68 manpower management plan is being established. ✓

NOTES 6/26/67 GEISSLER B 7/1

6/26/67

1. Apollo Near Pad Abort: A new study is underway by MSC to determine impact of spacecraft changes, since AS-204 on all aspects of the Apollo spacecraft abort conditions during the prelaunch, launch, and inflight phase. We are working with MSC personnel relative to interpretation of wind inputs for their studies and establishing probability statement. All required launch vehicle parameters have been made available. The spacecraft abort may be an area of concern depending upon developments in the MSC analysis. The Flight Limits Subpanel is informed and coordinating the subject.

2. Guidance Presentation to Dr. Mueller, June 16, 1967: Dr. Mueller's questions concerning the Saturn guidance scheme spotlighted some problems where the guidance, while capable of handling the assigned tasks, requires a considerable amount of clean-up and process streamlining. This applies to the translunar injection, where the precalculations could be reduced further if some of the analysis work which had to be given low priority for more than a year, could be speeded up and implemented. Another case is the rendezvous guidance, where we have restricted our work to the "launch from the ground" situation because of heavy losses of qualified personnel.

3. 1967 National Symposium of AAS: Subject: "Saturn V/Apollo and Beyond" Symposium, at which you spoke during the Executive Planning and Program Session, was participated in by six Aero-Astrodynamics Laboratory personnel. Dr. Helmut G. Krause served as Committee Chairman for the symposium and also presented a paper on "The Secular Perturbations of the Orbit of a Satellite Due to the Oblateness of the Central Body for the m-th Zonal Harmonics and Due to the Gravitational Attraction of a Third Body"; Mr. Helmut Horn served as Session Chairman of the Flight Mechanics, Trajectory Analysis, and the Astrodynamics Session; Mr. Rowland E. Burns spoke on "An Explicit Solution for the Lagrange Multipliers on the Singular Subarc of an Optimal Trajectory"; Mr. O. H. Vaughan spoke on "The Environment of Mercury"; Mr. Charles C. Dalton spoke on "Near Earth and Interplanetary Meteoroid Flux and Puncture Models"; and Mr. Thomas S. Dollman spoke on "A Construction of Probability Envelopes of Flux-Energy Spectra". This symposium was well attended by members of the scientific and aerospace communities. Although participation in such meetings requires considerable effort over and above normal work activities on the part of our personnel, I feel that strong technical participation speaks well for Marshall Center.

NOTES 6-26-67 GRAU

1. S-IVB PROGRAM: S-IVB-209 successfully static fired June 20, 1967, for full duration. The only problem noted after a "quick look" at the data was the cycling of a depleted sensor. The stage will now undergo a limited post-static checkout and be placed in storage.

2. IU PROGRAM: A recent IU audit chaired by Mr. Willoughby of MAR-R, in which this Laboratory participated, resulted in the conclusion that IBM at Huntsville has established and is implementing the necessary basic controls and procedures to deliver Instrument Units at a quality level required for manned space flight. At IBM, Cape Kennedy, some weakness exists in inspection criteria, procedures, and implementation. Although recent improvements have been made, most as the result of recent audits, some conditions remain that could potentially degrade overall IU quality. It was concluded that IBM/HSV, as the design congnizant organization, has not exercised sufficient influence over field operations in areas affecting hardware quality. IBM/HSV management responded encouragingly to this conclusion with proposals which would implement a more integrated working relationship between the two IBM facilities.

3. VISITORS FROM MSC: This Laboratory gave a presentation to Messrs. Bond and Bland of MSC on June 22, 1967. Subject matter, at the request of MSC, covered organizational structure; reliability and quality responsibilities; support contractor's role and inhouse Laboratory support; field organizations; flight safety; qualification testing; and MSFC participation in design reviews, hardware acceptance, and flight readiness reviews. As you are aware, MSC is considering the formation of a quality and reliability organization similar to MSFC's. Messrs. Bond and Bland indicated that they were to be the potential chief and deputy chief, respectively.

NOTES 6/26/67 HAEUSSERMANN

6/26/68

B 7/1

1. Radiation Damage to Electronic Components. The damaging radiation in low altitude earth orbit will be due almost entirely to trapped protons in the South Atlantic anomaly of the Van Allen radiation belt. The dose rate behind a 0.75 cm (0.3 in) shield, which is the normal assumed vehicle shielding, is about 0.5 rads* per day in a 240 nautical mile circular orbit with a 30° inclination. The dose rate for a 100 nautical mile orbit would negligible. Previous irradiation studies on typical semiconductors and other electronic components indicate that serious degradation does not occur until an integral dose on the order of 10^4 rads has been received.**

* Data taken from Vette, J. I., et al.: "Models of the Trapped Radiation Environment," Vols. 1-3 NASA SP-3024 (1966, 1967) contained in "Working Paper Charged Particle Dose Rates in Low Altitude 30° Inclination Orbits," by John W. Watts, Jr., Nuclear and Plasma Physics Division, Space Sciences Laboratory.

** Information received by private communication and from REIC Report No. 32, October 30, 1963, "Space Radiation Damage to Electronic Components and Materials," of the Battelle Memorial Institute.

NOTES 6/26/67 HEIMBURG

B 7/1

6/22/68

F-1 ENGINE Test FW-066 was conducted on the West Area F-1 Test Stand with Engine S/N F-5038-1 on June 22, 1967, for a planned duration. Primary test objective was to evaluate the thrust vector control system with a new servo-actuator filter assembly.

S-IVB-209 (SACTO) A review of data from the 456 seconds duration acceptance firing has revealed no problems. DAC has been directed to perform an abbreviated post-static checkout on test stand and then store the vehicle at SACTO until May 1968. Prior to shipping the vehicle to KSC, DAC will conduct a complete post-static checkout to verify all stage and engine systems.

S-IVB-504 (SACTO) (N) S-IVB-504 (N) arrived at SACTO on June 15; DAC has tentatively scheduled the acceptance firing for about August 15. There are now seven vehicles at SACTO; four in storage, two in post-static, one in pre-static checkout.

S-II (MTF) The A-1 lox flow test was conducted at MTF on Thursday, June 22, 1967. Lox was flowed at a rate of approximately 3500 GPM with no problems except for small leaks at the barge and transfer interface and the filter area on the S-1 stand.

S-IB (MSFC) A preliminary study concerning the possibility of static firing a solid rocket motor augmented S-IB stage in the S-IC test stand is under way and is to be completed this week.

S-IC (MTF) The S-IC-5 stage arrived at MTF on June 21, at approximately 10 pm. Stage installation in the test stand was attempted on June 22, but installation operations were discontinued due to problems with the 200-ton derrick. When the forward end of the stage was connected to the 200-ton hook and the lift was begun an observer noticed that the drum rotated in the opposite direction, momentarily. On the third attempt, drum rotation was corrected, but it was decided not to lift the stage until further investigation revealed the cause of these anomalies. The stage was replaced on the transporter and returned to the booster storage building. The Boeing Contracts are asking for a letter from NASA assuring the operational readiness of the derricks prior to stage installation. The stage should be installed on June 26 or 27, pending positive solution of this problem.

S-II STRUCTURAL TEST PROGRAM Phase I construction work is progressing on schedule.

HOLDDOWN ARMS (Ref NOTES 5/22/67) As previously reported, cracks were found in three of four holddown arm base castings of the fourth set of equipment after load tests at MSFC. Exact time of cracking is not known. One base casting has been repaired by M.E., and is being re-tested. The other two are in process of repair at M.E. Attached (for Dr. von Braun and Mr. Weidner only) is copy of KSC Inspection Report on 501 Holddown Arms signed by Buchanan. Discontinuities were found in two of the base castings by dye penetration tests, however, their conclusion is that suspected areas were not deformations due to cracking, but discontinuities of weld repairs during manufacture. KSC consideres arms satisfactory for launch.

NOTES 6-26-67 HOELZER

6/26 GD

B 7/1

RESOURCES SHARING: Through contacts made initially with GSA Atlanta, the Computation Laboratory was able to supply NARF (Naval Aviation Repairing Facilities) at Jacksonville Naval Air Station, and Pensacola Naval Air Station, with post processors for their numerical control machine tools which will decrease measurably their turn around time on refurbishing aircraft, and increase their capability to manufacture more complex shaped parts. ✓

NOTES 6/26/67 JOHNSON B 7/1

6/26/67

STRESS CORROSION - In pursuing the disposition of requests for funding in the stress corrosion problem area, the following information has been developed; a letter from Dr. Lucas to the Office of Manned Space Flight outlining a program and requesting funding was sent by Dr. Mueller to Dr. Adams asking for OART support. It has been referred to Mr. Deutsch in Dr. Kursweg's group for action. They have agreed to provide about two-thirds of the financial support requested utilizing funding available to them and funding available through the Aeronautics Division of OART. (The SST has similar and associated problems). They are preparing a letter to Dr. Mueller from Dr. Adams indicating this decision. We will submit the proper request for the agreed to effort in this area. ✓

NOTES 6-26-67 KUERS

6/26/67

B 7/1

S-II Manufacturing Producibility: The welding methods used so far for the girth welds in the S-II stage have resulted in weldments that frequently do not meet design requirements. This has now been reconfirmed by the S-II-6 investigation. The Lewis Report indicates that fracture mechanics considerations apply particularly critically in weld-repair areas. The reliable manufacturing producibility of the weldments is therefore again shown as having importance in all safety and flight worthiness considerations of the stage: structural stresses caused by weld repairs, offsets, porosity and weld "peaking" have to be minimized. From a manufacturing producibility point of view we still regard the MGA pulsed arc process as the preferred welding method, particularly for the #6 cylinder to LH_2 dome weld. R-P&VE, R-ME, and S&ID are all working on the assessment of pulsed arc weldment properties. The reasons for better producibility by the pulsed arc method are shown by a comparison of the characteristics of the present (GTA) with those of the "Pulsed Arc MGA" process.

Present GTA (or TIG)	Proposed "Pulsed Arc - MGA"
• Process has good penetration and requires relatively little filler wire.	• Less penetrating capability - joint preparation such as to make more filler wire necessary.
• All tacking and welding from the same side, therefore remelting of tacks during welding leading to possibility of offset.	• Tacking and welding done from alternate sides after suitable preparation, therefore joint is always constrained since tacks are not remelted.
• Remelting of tacks and penetration through the tacks causes oxidized surfaces to be included in weld bead.	• By always welding on fresh metal surfaces no oxidized surfaces are remelted into the bead.
• All welding from one side causes peaking.	• Welding from alternate sides balances distortion from weld shrinkage.
• Process is critical in cleaning, control and joint fit-up. Repairs are unavoidable in long welds. Repairs lead to uncontrollable distortions (e.g., "oil cans").	• Process is more tolerant in all regards; few repairs are anticipated. A ratio of weld repair frequency of better than 1:20 has been experienced in favor of this process.
• Straight polarity weld, hence no cathodic cleaning of weld metal.	• Reverse polarity, hence inherent cathodic cleaning of weld metal.
• Weld speed - low, hence process is affected by joint asymmetry. Unsymmetrical heating contributes to offset.	• Weld speed - high, hence less, if any, effect of joint asymmetry.

Fewer weld defects will of course de-emphasize the necessity for an engineering assessment of the effects of flaws. In other words, it is preferable to make weldments in a reproducible manner without, or with very few, flaws than it is to assess later through MRB action the acceptability of many random flaws and repairs. We would like to invite you to witness a demonstration of the process.

W.K. Ralph Rund told me again (during my visit to NAA/SD in Downey on 6/25) that he was convinced the "pulsed-Arc MIG" would result in lower cryogenic toughness (K_{CI}) than the TIG welds. He thought this was basic, and indeed to be expected!! B

B 7/1

NOTES 6-26-67 LUCAS

1. TITANIUM PRESSURE VESSELS MEETING AT MSC: (Reference NOTES 6-5-67 Lucas) In response to your question as to criticality of the long exposure time of the spacecraft APS tanks at pressure on the launch pad, we believe the problem is not critical. MSC tanks are made of 6Al-4V-Ti and welded with commercially pure titanium wire. In the thin-wall MSC tanks (our launch vehicle tanks have much heavier walls), there appears to be adequate alloying (during welding) between the parent material and the welding wire to solve the embrittlement problem. MSC has data to show this, but they did not present a good story at the meeting and, apparently, were unconvincing to the executives present. This problem may come up again in a meeting that you attend. If the tanks are built as designed, we believe MSC will not have a problem. MSC does not propose to use the eddy current inspection technique, apparently, because all tanks inspected so far have been indicated satisfactory and they are confident that the tanks will be built correctly. We believe that they could add a little assurance by inspecting each tank and have told them so. I believe that we should not become involved further in the problem but that you should have this information for back-up.

Dr. Debus
KSC
FYI
B

2. AAP THERMAL CONTROL: The second Apollo Applications Thermal and Environmental Control System Subpanel met at MSFC on June 20 and 21. One result was a significant broadening of the acceptable range of temperature to which an individual could be exposed. The previously established minimum limit on humidity was unchanged.

3. S-IVB AFT INTERSTAGE - PROTUBERANCE WAKE HEATING PROBLEM: P&VE, Boeing, and McDonnell Douglas Corporation personnel have discussed the protuberance wake heating problem of the S-IVB aft interstage. Although it appears that both Boeing and McDonnell Douglas used incorrect temperature values, the problem does exist. It was recommended that S-IVB-502 be insulated in the wake areas only. This would involve an application of 0.010 inch Korotherm for an approximate weight increase of 18 pounds. Insulation of S-IVB-503 and subs will depend upon final resolution of temperature value and strength allowables. Recommendations are expected to be released this week.

4. MULTIPLE DOCKING ADAPTOR (MDA): Docking port and window details have been completed and are ready for formal release. The top structural assembly drawing has been started. A layout was completed defining the interface requirements for the Orbital Workshop habitability equipment designed by McDonnell Douglas for installation in the MDA prior to launch.

5. SATURN V DAMPER: An agreed upon schedule for the completion of the ML-2 Redundant Hoist has been published. The date of delivery on dock at KSC by August 14, 1967, can be met if the necessary overtime is applied. The ML-3 Primary Damper delivery schedule is just being changed from September 4 to October 16, 1967. We have requested a schedule adjustment to October 24 or later based on normal operations within R&DO. The October 16 delivery will still require excessive overtime in ME, Test, and Quality Laboratories. IO is still trying to negotiate more reasonable dates with KSC.

6. S-IC-508 PROOF PRESSURE TEST: The rehydrostatic proof test of the S-IC-508 subsequent to finding a crack in the bulkhead/Y-ring weld of the fuel tank was completed. As verified by x-ray, the crack which was originally 0.400 inch long did not grow as a result of the proof test within the accuracy of crack length determination which is 0.002 inch.

NOTES 6/24/67 MAUS

6/24/67

B 7/1

OSSA LAUNCH VEHICLE STUDY - We have just received a copy of the presentation made by Mr. V. L. Johnson, Launch Vehicle and Propulsion Program Director, OSSA to Dr. Seamans on June 14, 1967. The objectives of the study presented were as follows:

(a) Determine the specific decisions and timing of these decisions concerning the composition of the NASA automated launch vehicle family,

(b) Provide a comparative cost analysis of annual and total costs of selected launch vehicle families through 1973, and

(c) Examine the relationship of launch vehicle decisions on spacecraft envelopes.

The following launch vehicles were considered:

Atlas/Centaur, Atlas/Agena, T-III/Agena, T-IIIC/Agena, T-IIIB/Centaur, T-III C/Centaur

We are reviewing this material to assess the possible impact that their mission model would have on our uprated Saturn I production.

UPRATED SATURN I/TITAN III - Dr. Mueller has forwarded a memo (which was proposed to him during his visit to MSFC) to Dr. Newell advocating the OSSA use of the uprated Saturn I and the rationale for charging OSSA. ✓ I told Seamans.

BOB VISIT - The BOB visit to the Center for July 10-14 has been postponed. Bernie Johnson's office at MSF indicates the visit will be postponed until mid-September immediately prior to or after the Saturn V launch. ✓

H.M.

I've discussed this extensively with Seamans and deGyatt during their recent visit. They gave me assurance that no rash decisions detrimental to the future of the Sat IB would be made. final plan (agency — side) only possible after FY 68 budget posture was authority firm, incl. Appropriations Committee actions and floor votes B

L.R.

NOTES 6/26/67 RICHARD

B 7/1

6/26/67

Minuteman Strap-on for AAP: We are having indications of a major tradeoff problem related to the Saturn IB Strap-on Minuteman solids and the impact on the pad facilities. KSC's early response shows a questionable deflector life with the solids mounted as we have planned. Mounting them to satisfy the KSC problem can be serious in the structures area.

We are in the process of pinning this problem down to find out just how serious it is.

Why not left-over elbows from Rocketdyne test stands?

Suggest you contact Bill Brown,

B

NOTES 6/26/67 RUDOLPH

6/26 PROOF

B 7/1

1. S-IC-8 Stage at Michoud: ~~Additional~~ pressure testing was completed on the fuel tanks on Wednesday, 21 June 67. Preliminary information indicates that flaws (which were detected by dye penetrant inspection after the hydrostatic testing) did not propagate. ✓

2. AS-502 Vehicle at KSC:

   o The vehicle has been checked-out as much as practicable while in the S-II spacer configuration; therefore:

   - IU and S-IVB Stages will be de-erected on Tuesday and Wednesday, 27 & 28 June 67.
     - LH_2 tank of S-IVB Stage will be entered while stage is in low bay in order to: repair the P.U. probe; cap 21 wires; replace a ground strap; and perform overall inspection.

   - S-II spacer will be de-erected on Friday, 30 June 67.

   o X-ray inspections of S-II-2 Stage LH_2 tank were completed on Sunday, 25 June 67; and no defects were found. ✓

   - Dye penetrant inspection of LH_2 tank is now underway.

   - Stage is scheduled for erection on Friday, 7 July 67. ✓

3. Lunar/Earth impacts for expended S-IVB/IU Stages:

   o At Reference Trajectory Sub-Panel Meeting on Monday, 19 June 67, AERO Lab indicated that for normal lunar missions 38% of S-IVB and IU Stages will impact the moon and 45% of S-IVB/IU Stages will re-enter the earth's atmosphere. ✓

   o Study will be made of ways to change the velocity in order to place these stages in a solar orbit. ✓

4. Boilerplate - 30 Spacecraft: (Alternate payload for Early Saturn V Missions)

   o QUAL Lab has discovered over 200 flaws in the welds of the four (4) aluminum tanks of the service module. R&DO has started repair of tanks and it is estimated that BP-30 will be back in the AS-501 flight ready condition by Monday, 24 July 67. ✓

NOTES 6/26/67 SPEER

6/26 KS

B 7/1

1. ETR ORBITAL SUPPORT: Re: your question on my notes of 6/12/67 (copy attached) concerning the fact that the Eastern Test Range (ETR), now allocates 75% of their time to orbital support. Since there has been a significant reduction in the number of ETR launches, the range with its extensive network has been assigned the function of maintaining surveillance of all satellites. Since the preparation for a particular satellite includes some software programing, calibration, etc., the range could be tied up a minimum of 30 minutes on each satellite pass. If the ETR is assisting in a checkout of the launch vehicle when a satellite pass occurs, they may eliminate their pad support for that time period with a possible impact on a launch. Therefore, the main message to NASA is not so much a sales pitch for additional orbital support; rather it is a warning signal that ETR support for NASA launches may not be continuous.

F.S. I think Jim Stevenson should insist on uninterrupted ETR support. This actually is ETR's primary mission! B

2. MCC-H AUGMENTATION: Kraft has briefed Dr. Mueller on 6/14 on the recommended expansion of building, equipment, and computers of the Mission Control Center - Houston (MCC-H) for AAP. Costs were not quoted but are believed to be generally known (50 M). Dr. Mueller requested an impact study if there were no augmentation. Stevenson has action to examine the MSC proposal in detail. Prospects for this augmentation are not too good.

3. AAP DATA FLOW AD-HOC WORKING GROUP: This MSC Working Group (W.G.) held its first meeting on 6/21. My office was invited and was represented at the meeting. We are assessing the potential of this W.G. to serve as primary operations interface between the Centers. The guidelines established by MSC and impressions of the 1st meeting indicate that this W.G. is not likely to become a satisfactory solution to our interface problem. In the absence of a Operations Panel we are now looking into the possibility of utilizing the existing panels to cover the operations area.

F.S. Please advise whether I should bring up the necessity of an Operations Panel during the forthcoming Logan Hideaway.

B

NOTES 6/26/67 STUHLINGER

6/26/67

B 7/1

No submission this week.

NOTES 6/26/67 TEIR

B 7/1

6/26/67

S-IB FOLLOW-ON: Reference my notes of June 5, 1967, (copy attached) concerning the extension of the present CPFF contract for long leadtime materials. Negotiations for a sixty day extension of the contract were completed June 16, 1967. The original plan was to extend this effort for a period of ninety days in order to protect the scheduled October 1968 delivery to KSC of S-IB-13 and to allow time for a more detailed evaluation of the CCSD proposal for the follow-on stage buy. Due to a change in the KSC need date for S-IB-13 to August 1969 (the contract delivery date will not necessarily be slipped this much) and the necessity to complete the contract action by June 30, 1967, it was decided to negotiate a sixty day extension of the effort. This will allow CCSD to prepare a proposal based on the most economical approach for the revised delivery schedule. Also, the sixty day extension can be approved locally. ✓

LM-1: Inspection and checkout of LM-1 at KSC began immediately after its arrival on Friday night, June 23, 1967. ✓

S-IVB-209 STATIC TEST: The stage was successfully acceptance tested June 20, 1967, at approximately 11:45 AM PDT at the DAC Sacramento Test Center. The stage was fired for a mainstage duration of approximately 456 seconds and was terminated by a LOX depletion cutoff as planned. The countdown and firing proceeded smoothly with no known problems. ✓

SA-204 MODIFICATIONS: KSC has scheduled the week of July 3 for incorporation of any launch vehicle and launch complex ESE modification and has requested that mod kit deliveries be expedited to coincide with this schedule. We should be able to comply with only one or two exceptions. ✓

MSFC/KSC SUBAGREEMENT: Personnel from KSC and MSFC have been meeting this week to update the MSFC/KSC Prelaunch Checkout and Launch Operations Subagreement to make it compatible with APD No. 26. We are generally in agreement with KSC and anticipate no difficulty in having an updated subagreement within the next few weeks. ✓

REAL TIME ANEMOMETER DATA FOR HOSC: We are furnishing KSC $60,000.00 of FY-68 funds for installation of a system which will provide the HOSC real time anemometer data from LC-34 and LC-37B. I have been informed that KSC still does not have a firm date for completion of installation but it appears that the system will not be operational for the AS-204/ LM-1 launch according to the present launch schedule. ✓

NOTES 6/26/67 WILLIAMS B 7/1

6/26 PS F.L. What do you mean by that? B

1. Station Module:

The DAC presentation on the S-IVB station module was held at Huntington Beach, June 21. Many of the conclusions reached in subsystems selection or configuration approaches appear reasonable, but they lacked evidence of detailed parametric analysis to justify the selections. We are requesting that a significant part of the remaining effort in the contract be directed toward obtaining more detailed parametric data to substantiate the selections. ✓

2. Nuclear Flight Studies:

Mr. Saxton of ASO attended a ROVER Flight Safety meeting at SNPO-Cleveland on June 20-21, 1967. Lockheed Missiles and Space Company, Aerojet/General Corporation, and Westinghouse Astronuclear Laboratory reviewed current contracted nuclear flight safety studies which are to be completed in mid-July and presented to Milt Klein (SNPO). The presentation is to show that suborbital start of nuclear vehicles can be accomplished in a safe manner, accepting a payload penalty for the safety system, while demonstrating a substantial payload improvement over an all-chemical system. The Klein presentation will take place on or about July 18, 1967. ✓

3. AAP Experiments Computer Program:

The first cut at the design of the Center computer program for AAP experiments has been completed. Computation Lab has assigned people to work with us and programming has begun. Headquarters is sending data next week for an update of the OMSF Experiments Reports. ✓